BRITISH COLUMBIA
MINISTRY OF FORESTS

Lakes
Timber Supply Area

Rationale for
Allowable Annual Cut (AAC)
Determination

Effective October 1, 2004

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Table of Contents

Page

Objective of this Document ... 1
Description of the TSA ... 1
Critical issue: Epidemic mountain pine beetle infestation ... 2
Expedited process for an urgent AAC determination to address the infestation ... 3
History of the AAC ... 4
New AAC determination ... 5
Information sources used in the AAC determination ... 5
Role and limitations of the technical information used ... 6
Statutory framework ... 7
Guiding principles for AAC determinations ... 7
  Guiding principles with respect to First Nations ... 9
The role of the base case timber supply analysis ... 9
  Base case forecast for the Lakes TSA ... 10
Consideration of factors as required by section 8 of the *Forest Act* ... 11
  Land base contributing to timber harvest ... 11
    - general comments ... 11
    - Cheslatta Community Forest ... 11
    - non-merchantable species ... 12
    - deciduous forest types ... 12
    - riparian land base exclusions ... 12
  Existing forest inventory ... 12
    - status of current inventory ... 12
    - volume estimates for existing natural stands ... 13
  Expected rate of growth ... 13
    - estimates for site productivity ... 13
    - minimum harvestable ages ... 13
    - shelf life ... 14
  Regeneration delay ... 15
  Impediments to prompt regeneration ... 15
  Not-satisfactorily-restocked areas ... 15
  Mortality in immature pine stands ... 16
  Silvicultural systems ... 16
  Rehabilitation programs ... 16
  Utilization standards ... 17
  Decay, waste and breakage ... 17
  Forest stewardship principles ... 17
    - cutblock adjacency, forest cover and green-up ... 20

- visually sensitive areas 20
- identified wildlife 21
- stand-level biodiversity 22
- landscape-level biodiversity 22
First Nations considerations 23
- First Nations consultation 24
Land and resource management plans 25
Alternative harvest flows 25
Minister's letter and memorandum 26
Local objectives 26
Epidemic mountain pine beetle infestation 27
- the beetle 27
- assessment of the mountain pine beetle epidemic 27
- 'controlling' the MPB 28
- current management strategy 29
- timber supply analysis—assumptions and results 29
- timber supply analysis—alternative projections 31
Reasons for Decision 32
Determination 34
Implementation 35
Appendix 1: Section 8 of the *Forest Act* 36
Appendix 2: Section 4 of the *Ministry of Forests Act* 38
Documents attached: 38
Appendix 3: Minister of Forests' letter of July 28, 1994 38
Appendix 4: Minister of Forests' memo of February 26, 1996 38
Appendix 5: Summary of Public Input 38

Objective of this Document

This document is intended to provide an accounting of the factors I have considered and the rationale I have employed in making my determination, under Section 8 of the *Forest Act* (the Act), of the allowable annual cut (AAC) for the Lakes timber supply area (TSA). This document also identifies the need for new forest policy to address forest management issues arising from the mountain pine beetle epidemic in the province.

Description of the TSA

The Lakes TSA is located in central British Columbia and covers approximately 1.12 million hectares of the Nadina Forest District, one of nine districts in the Northern Interior Forest Region. The TSA is administered by the Nadina Forest District office in Burns Lake. The Lakes TSA extends from Babine Lake in the north to the Entiako River in the south. The TSA lies along the western edge of B.C.'s interior plateau and is characterised by gently rolling uplands and a high concentration of lakes. Three major lake systems—Babine, Francois and Ootsa—intersect the TSA in an east-west direction, and almost 10 percent of the TSA is classified as lakes. The northeast portion of Tweedsmuir Provincial Park is adjacent to the southern part of the TSA.

Three biogeoclimatic zones are found in the Lakes TSA. The dominant zone in the TSA, and in the central interior of the province, is the Sub-Boreal Spruce (SBS) Zone. The SBS is found in valley bottoms up to elevations of about 1300 metres, with a climate characterised by moderate annual precipitation, severe, snowy winters and relatively short, warm, moist summers. Lodgepole pine, hybrid white spruce and subalpine fir are the dominant tree species. The Engelmann Spruce-Subalpine Fir (ESSF) zone is the uppermost forested zone in the Lakes TSA, typically occurring in pockets throughout the TSA, above the SBS zone. Steep topography, along with wet, cool summers and long, snowy winters, characterise this zone. Engelmann spruce and subalpine fir are the dominant climax tree species, while lodgepole pine is common after fires.

The Alpine Tundra (AT) zone occurs in very small areas above 1600 metres. The climate is cold, windy and snowy with a short, cool growing season. By definition, this zone is treeless, although stunted trees are common at lower elevations of this zone. Vegetation is dominated by shrubs, herbs, mosses and lichens. Much of the alpine landscape lacks vegetation and is the domain of rock, ice and snow.

The forests of the Lakes TSA support a wide variety of wildlife species that are adapted to either surviving or avoiding the severe winters. These include moose, caribou, grizzly bear, mule deer, black bear and small fur-bearers. A number of special habitat management areas occur in the TSA, such as the caribou migration corridor from Chief Louis Lake to Tetachuck Lake; significant grizzly habitat areas in the Sutherland Valley and Klaytunkut Creek; and ungulate winter habitat for provincially important moose and the regionally and provincially significant Tweedsmuir-Entiako caribou herd.

Approximately 745 000 hectares, about 66 percent of the TSA land base, are considered Crown productive forest land. Currently about 79 percent of that productive forest is considered suitable and available for timber harvesting, representing about 52 percent of the total TSA land base. The TSA's forests are relatively homogeneous. Lodgepole pine stands, both pure and mixed with other species, dominate the TSA, representing about 76 percent of stands in the timber harvesting land base. A further 20 percent is covered by predominantly spruce stands, and 4 percent by stands of predominantly balsam and Douglas-fir.

The TSA is a sparsely populated area with many small rural communities. The major population centre is the Village of Burns Lake, where about one-third of the TSA's population of 6,900 (1996 census) reside. Other communities include Decker Lake, Tintegal, Francois Lake, Southbank, Grassy Plains, Danskin, Takysie Lake and Ootsa Lake.

The forests of the TSA provide for a wide range of resources, including forest products, fish and wildlife habitat, and recreation and tourism amenities. Recreational use of the forests is moderately high due to the proximity of Tweedsmuir Provincial Park and the high concentration of lakes in the TSA. Recreational activities are primarily fishing, boating and hunting. The visual quality of the TSA's landscapes is important to recreation and tourism.

Six First Nations have reserve lands and communities in the TSA, with a total population of about 2,500 persons. These First Nations are the Cheslatta Carrier Nation, Burns Lake Band, Nee Tahi Buhn Band, Skin Tyee Band, Wet'suwet'en First Nation and Lake Babine Nation. These local First Nations and five others, the Nadleh Whut'en Band, Stellat'en First Nation, Tl'azt'en Nation, Ulkatcho Band, and the Yekooche First Nation, claim traditional territories that overlap within the TSA. Several First Nations, both local and non-local, are negotiating comprehensive land claims within the TSA. Once the treaty processes are complete, the treaties will be considered in future timber supply reviews.

Critical issue: Epidemic mountain pine beetle infestation

This section introduces the considerations presented in detail later under the Epidemic mountain pine beetle infestation section.

The Lakes TSA is part of a vast area in central British Columbia that is currently infested by the mountain pine beetle (MPB). In this TSA the volume of timber killed on the timber harvesting land base has grown from less than one half million cubic metres in 1999 to about 16 million cubic metres in 2003. The infestation is epidemic in the TSA and now threatens most of the mature and near-mature lodgepole pine stands in the TSA—the majority of the TSA's harvestable and merchantable timber. Table 1 shows the results of an analysis conducted by staff from the BC Ministry of Forests Research Branch and the Canadian Forest Service. The data in the table shows the observed volume of pine greater than 60 years old killed up to 2003 and the projected volume killed up to 2010. The numbers reported for 2004 onwards are projections based on the previous year's flight of beetles. For example, the table shows that there will be 25 million cubic metres of pine killed in the Lakes TSA in 2005. This projection is based on the expected number of trees attacked in 2004 after the beetles have flown to their new host trees.

Table 1: Estimated merchantable volume (millions m3) of beetle-killed pine on the timber harvesting land base in the Lakes, Prince George and Quesnel TSAs, 2004.

TSA	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Lakes	0.3	1	4	9	16	21	25	30	34	38	42	46
PG	5	7	10	21	38	59	79	100	127	141	158	171
Quesnel	4	4	7	13	28	44	56	66	73	79	83	87
Total	**9**	**13**	**21**	**43**	**83**	**124**	**160**	**196**	**234**	**258**	**283**	**304**

Source: Derived from the Provincial Level Projection of the Current Mountain Pine Beetle Outbreak, MoF & CFS (unpublished) May 2004.

The current mountain pine beetle infestation in the interior of British Columbia is unprecedented in recorded history. There are two contributing factors to the current outbreak that may not have occurred together before in BC. The first of these is the climatic conditions that have prevailed in the last 8-10 years in the northern interior. Over this time period, there have been unusually mild winters coupled with relatively warm summers. These conditions have allowed the mountain pine beetle populations to build relatively unchecked by winter mortality. The second factor contributing to the current outbreak is the large volume of mature lodgepole pine, which is the primary host for the mountain pine beetle. The combination of these two factors has allowed the epidemic to become unusually large, and to continue for a long period of time. The extremely large numbers of beetles being produced by this epidemic are contributing to the continuation of the attack, and allowing for unusual behaviour, including significant areas of younger pine trees being attacked.

In recent years a number of actions have been tried in the TSA to reduce the rate of spread of the beetle. Unfortunately, none of these actions have been completely successful and the TSA is now considered over-run by the MPB. The best chance of ending this beetle infestation is for cold spells with temperatures of minus 25 degrees Celsius in early fall or late spring. Alternatively, the infestation will end when the MPB no longer has a suitable lodgepole pine host.

It is unclear exactly how long timber damaged by the MPB will be usable for manufacturing lumber, or even pulp. Stands in the Chilcotin are still being harvested 20 years after the infestation; however, given the climatic conditions in much of the Lakes TSA, their usability could be as little as 5 years. There are also ongoing risks of loss to fire. The severity of the current infestation not only places the future timber supply from much of the TSA in jeopardy, it also affects watershed functioning and impacts many other forest values, including recreation, biodiversity, landscape aesthetics, cultural heritage, range, fish and wildlife, and possibly residential areas.

Since accelerated harvesting can help to salvage at least part of an already rapidly growing and otherwise potentially very large economic loss, an urgent, early review of the AAC for the TSA has now being completed.

Expedited process for an urgent AAC determination to address the infestation

Prompt harvesting of stands in which beetles are still present may reduce the rate of spread, conserving forest values and recovering otherwise lost timber resources and Crown revenues. For this reason, to the extent possible, the current AAC is completely dedicated to removing, as a first priority, timber that has already been attacked. Even so, there is concern from district staff that without an increased harvest level, some of the already attacked timber has the potential to become unsuitable for lumber manufacturing before it could be harvested given the current level of harvesting within the lakes TSA. The current AAC therefore might not provide sufficient volume to harvest at the level necessary to ensure recovery of the value of the already infested and damaged timber and might be insufficient to keep up with projected ongoing losses, even after consideration is given to retaining unharvested areas to meet environmental goals.

In contemplation of the need to provide remedies for this and similar situations, the *Forest Act* (section 8(8)(e)) requires the chief forester, in determining AACs for TSAs, to consider

> **abnormal infestations in and devastations of, and major salvage programs planned for, timber on the area.**

In January 2004, both the Nadina Forest District Manager and the Regional Manager of the Northern Interior Forest Region requested an urgent review of the timber supply in the Lakes TSA, and in particular, early consideration of a possible temporary increase in the allowable annual harvest level to facilitate salvage operations necessary to address the mounting severity of the MPB problem.

In response to these requests, the review of the timber supply for the Lakes TSA was given a high priority and the review process itself was modified to allow for an early completion. To provide an opportunity for public review under the accelerated schedule, a shortened, 30-day period for public review and comment was provided in place of the normal 60-day period, following the release, on June 10, 2004, of a public discussion paper (PDP). In accordance with existing commitments, First Nations groups were allowed 60 days–until August 13, 2004– to provide comments on the PDP.

Having considered the rapid increase in the MPB population in the TSA, as well as the proximity of the infestation to a large area of the beetles' preferred host—mature lodgepole pine—and the potential effects of the infestation on the standing timber inventory, on the future timber supply and on other values in the TSA, I was satisfied that the epidemic indeed had reached a level that posed an immediate and severe risk to the TSA. Having also reviewed the results of the analysis in the PDP, I became further satisfied that an early AAC determination, with particular weight given to considerations under section 8(8)(e) of the *Forest Act*, could be of crucial assistance in remedying some of the serious problems related to the MPB infestation.

On this basis I have proceeded to make such a determination in as timely a manner as possible, giving consideration to all of the land use, forest growth, forest management, social and economic and other factors required by the statute to be considered. Under the circumstances described and for the reasons given, I have placed particular weight on my considerations under section 8(8)(e) of the *Forest Act*. This rationale statement details the full considerations and reasoning on which my determination is based.

History of the AAC

In 1982 the AAC for the Lakes TSA was set at 1.5 million cubic metres. This AAC of 1.5 million cubic metres was confirmed in 1987. In 1996 the AAC for the TSA was again determined to be 1.5 million cubic metres.

Effective August 1, 2001, the AAC for the Lakes TSA was increased to 2 962 000 cubic metres per year. This increase was intended to facilitate the salvage of timber damaged by the mountain pine beetle (MPB) then spreading across the TSA and also to reduce the extent of future damage. At the time of that determination I asked staff to monitor the condition of the MPB infestation, on the understanding that, if and when required, the determination may be revisited at a date earlier than required by statute.

New AAC determination

Effective October 1, 2004, the new AAC for the Lakes TSA will be 3 162 000 cubic metres, an increase of 200 000 cubic metres, which is about 7 percent higher than the previous AAC. The purpose of this increase is to provide the district with sufficient AAC to salvage timber killed by the current and projected MPB epidemic.

This AAC will remain in effect until a new AAC is determined, which must take place within five years of this determination. However, the following observations are important to, and form an integral part of this determination. The previous 2001 AAC increase and the new increase should be targeted towards pine stands that have been impacted by the beetle infestation, with the 2004 increase primarily aimed at mortality in the moderately and severely impacted pine stands. Staff of the BCFS will monitor and apprise the chief forester of the condition of the MPB infestation, on the understanding that, if and when required, this determination may be revisited at a date earlier than required by statute.

Information sources used in the AAC determination

Information considered in determining the AAC for the Lakes TSA includes the following:

- *Lakes Timber Supply Area: Rationale for AAC Determination*, July 2001;
- *Expedited timber supply review for the Lakes, Prince George and Lakes timber supply areas Public Discussion Paper*, June 2004;
- *Provincial Level Projection of the Current Mountain Pine Beetle Outbreak: An Overview of the Model (BCMPB) and Draft Results of Year 1 of the Project*, Canadian Forest Service and BC Forest Service, 2004;
- *Mountain pine beetle, Forest Pest Leaflet 76*, Unger, L.S. Forestry Canada, Pacific Forestry Centre, Victoria, BC. 1993;
- Lakes Land & Resource Management Plan (LRMP), January 2000;
- Statement of District Manager Policy concerning LRMP implementation, January 10, 2001;
- Government of British Columbia, Higher Level Plan Order July 26th 2000;
- *Silvicon report on MPB*, April 2001;
- Forest Inventory Planning file, British Columbia Forest Service (BCFS);
- *Lakes TSA Inventory Audit*, BCFS Resource Inventory Branch, January 1999;
- *Forest Practices Code Managing Identified Wildlife Guidebook*, 1999, Ministry of Environment, Lands and Parks (MELP) and BCFS;
- Letter from the Minister of Forests to the chief forester, dated July 28, 1994, stating the Crown's economic and social objectives for the province;
- Memorandum from the Minister of Forests to the chief forester, dated February 26, 1996, stating the Crown's economic and social objectives for the province regarding visual resources;

- Letter from the Deputy Ministers of Forests and Environment, Lands and Parks, dated August 25, 1997, conveying government's objectives regarding the achievement of acceptable impacts on timber supply from biodiversity management;
- *Higher Level Plans: Policy and Procedures*, BCFS and MELP, December 1996;
- *Riparian Management Area Guidebook*, BCFS and MELP, December 1995;
- *Landscape Unit Planning Guide* BCFS and MELP, March 1999;
- *Forest Practices Code of British Columbia Act*, consolidated to June 1999;
- *Forest Practices Code of British Columbia Act: Regulations and Amendments*, consolidated to June 1999;
- Lakes South Sustainable Resource Management Plan, (approved pursuant to *Forest Practices Code of British Columbia Act section 4 (1) and 4 (2))*, July 2003;
- *Forest and Range Practices Act*, consolidated to November 2002; and
- Technical review and evaluation of current operating conditions through comprehensive discussions with staff of the Ministries of Forests, Sustainable Resource Management and of Water, Land and Air Protection at the AAC determination meeting held in Prince George, BC, July 13-15, 2004.

Role and limitations of the technical information used

Section 8 of the *Forest Act* requires the chief forester, in determining AACs, to consider biophysical, social and economic information. Most of the technical information used in determinations is in the form of a timber supply analysis and its inputs of inventory and growth and yield data. These are concerned primarily with biophysical factors—such as the rate of timber growth and the definition of the land base considered available for timber harvesting—and with management practices.

The computerised analytical models currently used to assess timber supply unavoidably simplify the real world and also involve uncertainty in many of the inputs, due in part to variations in physical, biological and social conditions. While ongoing science-based improvements in the understanding of ecological dynamics will help reduce some of these uncertainties, technical information and analytical methods alone cannot incorporate all the social, cultural and economic factors relevant to forest management decisions, nor do they necessarily provide complete answers or solutions to the forest management problems addressed in AAC determinations. However, they do provide valuable insight into potential outcomes of different resource-use assumptions and actions—important components of the information that must be considered in AAC determinations.

In determining the AAC for the Lakes TSA I have considered and discussed known limitations of the technical information provided, and I am satisfied that the information provides a suitable basis for my determination.

Statutory framework

Section 8 of the *Forest Act* requires the chief forester to consider particular factors in determining AACs for timber supply areas (TSAs) and tree farm licences (TFLs). Section 8 is reproduced in full as Appendix 1.

Guiding principles for AAC determinations

Rapid changes in social values and in the understanding and management of complex forest ecosystems mean there is always uncertainty in the information used in AAC determinations. In making the large number of periodic determinations required for British Columbia's many forest management units, administrative fairness requires a reasonable degree of consistency of approach in incorporating these changes and uncertainties. To make my approach in these matters explicit, I have set out the following body of guiding principles. In any specific circumstance where I may consider it necessary to deviate from these principles, I will explain my reasoning in detail.

Two important ways of dealing with uncertainty are

(i) minimizing risk, in respect of which in making AAC determinations I consider particular uncertainties associated with the information before me and attempt to assess and address the various potential current and future, social, economic and environmental risks associated with a range of possible AACs; and

(ii) re-determining AACs frequently, in cases where projections of short-term timber supply are not stable, to ensure they incorporate current information and knowledge—a principle that has been recognized in the legislated requirement to re-determine these AACs every five years. This principle is central to many of the guiding principles that follow.

In considering the various factors that Section 8 of the *Forest Act* requires the chief forester to take into account in determining AACs I attempt to reflect, as closely as possible, operability and forest management factors that are a reasonable extrapolation from current practices. It is not appropriate to base my decision on unsupported speculation with respect to factors that could work to *increase* the timber supply—such as optimistic assumptions about harvesting in unconventional areas, or using unconventional technology, that are not substantiated by demonstrated performance—or with respect to factors that could work to *reduce* the timber supply, such as integrated resource management objectives beyond those articulated in current planning guidelines or the Forest Practices Code—'the Code'—which is now in transition to the Province's *Forest and Range Practices Act*.

In many areas the timber supply implications of some legislative provisions, such as those for landscape-level biodiversity, remain uncertain, particularly when considered in combination with other factors. In each AAC determination I take this uncertainty into account to the extent possible in context of the best available information.

As British Columbia progresses toward the completion of strategic land-use plans, in some cases the eventual timber supply impacts associated with land-use decisions resulting from various regional and sub-regional planning processes remain subject to some uncertainty before formal approval by government. In determining AACs it has been and remains my practice not to speculate on timber supply impacts that may eventually result from land-use decisions not yet finalised by government.

In some cases, even when government has made a formal land-use decision, it is not necessarily possible to fully analyse and account for the consequent timber supply impacts in a current AAC determination. Many government land-use decisions must be followed by detailed implementation decisions requiring for instance the establishment of resource management zones and resource management objectives and strategies for those zones. Until such implementation decisions are made it would be impossible to fully assess the overall impacts of the land-use decision. In such cases the legislated requirement for frequent AAC reviews will ensure that future determinations address ongoing plan-implementation decisions. Wherever specific protected areas have been designated by legislation or by order-in-council, these areas are deducted from the timber harvesting land base and are not considered to contribute any harvestable volume to the timber supply in AAC determinations, although they may contribute indirectly by providing forest cover to help in meeting other objectives, for example for biodiversity or community watersheds.

Where appropriate, I will consider information on the types and extent of planned and implemented intensive silviculture practices as well as relevant scientific, empirical and analytical evidence on the likely magnitude and timing of their timber supply effects.

The Lakes TSA lies within the area covered by the Lakes Land and Resources Management Plan that was approved by government in April 2000. Forest development in the TSA is required to be consistent with aspects of the plan that incorporate direction by the Higher Level Plan approved in July 2000, as provided under the Forest Practices Code. In a letter to licensees, the District Manager confirmed the requirement to follow the objectives of the LRMP. The timber supply analysis and my considerations in this AAC determination assume consistency with the direction from the LRMP as representative of current management.

Some have suggested that, given the large uncertainties present with respect to much of the data in AAC determinations, any adjustments in AAC should wait until better data are available. I agree that some data are not complete, but this will always be true where information is constantly evolving and management issues are changing. Moreover, in the past, waiting for improved data created the extensive delays that resulted in the urgency to re-determine many outdated AACs between 1992 and 1996. In any case, the data and models available today are superior to those available in the past, and will undoubtedly provide for more reliable determinations.

Others have suggested that, in view of data uncertainties, I should immediately reduce some AACs in the interest of caution. However, any AAC determination I make must be the result of applying my judgement to the available information, taking any uncertainties into account. Given the large impacts that AAC determinations can have on communities, no responsible AAC determination can be made solely on the basis of a response to uncertainty. Nevertheless, in making my determination, I may need to make allowances for risks that arise because of uncertainty.

Overall, in making AAC determinations, I am mindful of the mandate of the Ministry of Forests as set out in Section 4 of the *Ministry of Forests Act*, and of my responsibilities under Section 8 of the *Forest Act*, under the Code, and under the new *Forest and Range Practices Act*.

Because the new regulations of the *Forest and Range Practices Act* are designed to maintain the integrity of British Columbia's forest stewardship through responsible forest practices, it is not expected that the implementation of the legislative changes will significantly affect current timber supply projections made using the Code as a basis for definition of current practice.

Guiding principles with respect to First Nations

With respect to First Nations' issues, I am aware of the Crown's legal obligations resulting from recent decisions in the Supreme Court of Canada. The AAC that I determine should not in any way be construed as limiting the Crown's obligations under these decisions, and in this respect it should be noted that my determination does not prescribe a particular plan of harvesting activity within the Lakes TSA. It is also independent of any decision by the Minister of Forests with respect to subsequent allocation of the wood supply.

The British Columbia Court of Appeal decided in March 2002 that the Crown has an obligation to consult with First Nations with respect to asserted rights and title in a manner proportional to the apparent strength of the claimed interests. As a matter of course, I consider any information brought forward by all parties respecting First Nation ' interests. In particular I consider information related to actions taken to protect interests, including operational plans that describe forest practices designed to address First Nations' interests. In this context, I re-iterate that my AAC determination does not prescribe a particular plan of harvesting activity, nor does it involve allocation of the wood supply to any particular party.

Subsequent to a determination, if I become aware of information respecting First Nations' interests that would substantially alter my understanding of relevant circumstances, I may revisit my determination sooner than as required by the *Forest Act*.

The role of the base case timber supply analysis

In considering the factors required under Section 8 of the *Forest Act* to be addressed in AAC determinations, I am assisted by timber supply forecasts provided to me through the work of the Timber Supply Review program for TSAs and TFLs.

For each AAC determination for a TSA a timber supply analysis is carried out by British Columbia Forest Service (BCFS) staff using an information package including data and information from three categories—land base inventory, timber growth and yield, and management practices. Using this set of data and a computer model (FSSIM—'Forest Service Simulator'; in this case for the Lakes TSA, 'version 3'), a series of timber supply forecasts is produced, reflecting different decline rates, starting harvest levels, and potential trade-offs between short- and long-term harvest levels.

From this range of forecasts, one is chosen which attempts to avoid excessive changes from decade to decade and significant timber shortages in the future, while ensuring the long-term productivity of forest lands. Often termed the 'base case', this serves as a reference forecast, and forms the basis for comparison when assessing the implications of uncertainty for timber supply.

Because it represents only one in a number of theoretical forecasts, and because it incorporates information about which there may be some uncertainty, the base case reference forecast for a TSA is not an AAC recommendation. Rather, it is one possible forecast of timber supply, whose validity—as with all the other forecasts provided—depends on the validity of the data and assumptions incorporated into the computer simulation used to generate it.

Therefore, much of what follows in the considerations outlined below is an examination of the degree to which all the assumptions made in generating the reference forecast(s) are realistic and current, and the degree to which the resulting predictions of timber supply must be adjusted, if necessary, to more properly reflect the current situation.

Such adjustments are made on the basis of informed judgement, using current available information about forest management, which may well have changed since the original information package was assembled. Forest management data is particularly subject to change during periods of legislative or regulatory change, or during the implementation of new policies, procedures, guidelines or plans. Thus it is important to remember that while the timber supply analysis with which I am provided is integral to the considerations leading to the AAC determination, the AAC is not determined by calculation but by a synthesis of judgement and analysis in which numerous risks and uncertainties must be weighed. Depending upon the outcome of these considerations, the resulting AAC may or may not coincide with the base case forecast. Moreover, because some of the risks and uncertainties considered are qualitative in nature, once an AAC has been determined, further computer analysis of the combined considerations may not confirm or add precision to the AAC.

Base case forecast for the Lakes TSA

The timber supply analysis was based on the same data that was used in the 2001 analysis, and updated for growth and harvest depletions and for the spread of the mountain pine beetle infestation. That data package, which included detailed descriptions of the management practices and the assumptions used to incorporate them into the analysis, was released for public review in March 1999. In the interest of expediency, a new data package was not published for this analysis.

Because forest management is inherently a long-term undertaking, uncertainty is present in much of the information used in analysing the timber supply. Any base case thus provides only a part of the timber supply picture for a TSA, and should not be viewed in isolation from accompanying sensitivity analysis. In my determination I have considered a number of relevant sensitivity analyses in assessing particular uncertainties, as well as several alternative harvest forecasts, as documented in this rationale statement.

For the Lakes TSA, a harvest forecast was selected to represent the potential timber supply based on the beetle infestation projected to 2005 (i.e. reflects the projected mortality associated with the 2004 beetle flight) by staff from the Ministry of Forests Research Branch. This *2004 beetle forecast,* or base case, shows that a harvest of 3.13 million cubic metres per year is required for five years to harvest the moderately and severely affected pine stands before declining to a harvest level of 1.5 million cubic metres per year for the following five years. From the second to the ninth decade, a harvest of 1.341 million cubic metres per year is projected for the TSA. The long-term harvest level of 1.6 million cubic metres per year is attained nine decades from now. The implications for the projected timber supply are considered in detail under Epidemic mountain pine beetle infestation, and are further discussed in various sections including Impediments to prompt regeneration, Forest stewardship principles, and Alternative harvest flows.

To determine the AAC for the Lakes TSA, I have relied in part on this base case projection of the timber supply, and also on several other related forecasts, in accordance with my assessments of the validity of the assumptions incorporated in the projections, as discussed in the following sections of this document.

In this rationale, I will discuss many of the analysis assumptions in the context of my considerations for this AAC determination. However, for some factors, my review of the assumptions has indicated that I am satisfied the factor was appropriately modelled in the base case of the timber supply analysis. In such cases I will not discuss my considerations in this document, other than to note my agreement with the approach adopted in the base case. However, some factors for which the assumptions were appropriately modelled in the analysis may warrant

discussion for other reasons, such as public input, lack of clarity in the analysis, or concerns resulting from the previous determination for the Lakes TSA. As a result, I may choose to provide my consideration of such factors in this rationale.

I have also considered all public input received on the public discussion paper, and where appropriate I discuss this input in my considerations under the various factors presented in this rationale.

Consideration of factors as required by section 8 of the *Forest Act*

Section 8 (8)

In determining an allowable annual cut under this section the chief forester, despite anything to the contrary in an agreement listed in section 12, must consider

(a) the rate of timber production that may be sustained on the area, taking into account

(i) the composition of the forest and its expected rate of growth on the area:

Land base contributing to timber harvest

- general comments

The total area of the Lakes TSA, as estimated from BCFS inventory data updated to December 31, 1997 is 1 124 552 hectares. Of this, 744 896 hectares are productive Crown forest land.

As part of the process used to define the timber harvesting land base for a TSA, (i.e. the area estimated to be economically and biologically available for harvesting), a series of deductions is made from the total area of the productive forest. These deductions account for factors that effectively reduce the suitability or availability of the productive forest for economic, ecological or social reasons (e.g. parks). In timber supply analysis, assumptions, and if necessary, projections, must be made about these factors, prior to quantifying appropriate areas to be deducted from the productive forest, in order to derive the timber harvesting land base.

In the Lakes TSA, a total of 154 907 hectares, or 20.8 percent of the productive Crown forest is currently used to provide critical wildlife habitat, wildlife tree patches, riparian reserve areas, or lies in areas of environmental sensitivity or low productivity, or supports non-merchantable forest types, or for other reasons is unavailable for timber harvesting. These areas were deducted from the total productive Crown forest area in deriving the current timber harvesting land base. As a result, 76.7 percent of the productive forest, or 50.8 percent of the total TSA area is included in the current timber harvesting land base of 571 000 hectares. My considerations respecting the individual deductions applied in deriving the timber harvesting land base are presented in the following sections.

- Cheslatta Community Forest

On October 2, 2002, the Cheslatta community forest was created in a portion of Cheslatta landscape unit. The award of the community forest to the Cheslatta First Nation reduced the timber harvesting land base managed by the Crown by about 18 980 hectares since the last timber supply analysis. This land base change was incorporated in the current analysis and I make no adjustments to the base case timber supply projections on this account.

- non-merchantable species

In deriving the timber harvesting land base for the analysis, certain forest types described by particular inventory type groups were included or excluded in accordance with their merchantability as defined by cruise data and current harvesting performance in the TSA. I have reviewed the species included and excluded, and I am satisfied that current practice is adequately represented in the analysis in this respect.

- deciduous forest types

Deciduous forest types are those stands dominated by deciduous, broad-leaved species. It is clear that deciduous species—which are not targeted by the MPB, but which are in many cases interspersed with pine in areas of severest attack—are potentially capable of making an important contribution to the provision of forest cover for biodiversity purposes following the required harvest of large areas of infested pine particularly in mixed stands.

In this analysis all deciduous-leading stands have been deducted from the timber harvesting land base to reflect that they are currently not commercially utilized in this TSA. I support this approach and therefore I make no adjustments to the base case timber supply projections.

- riparian land base exclusions

Riparian habitats occur along streams and around lakes and wetlands. Both the Forest Practices Code and the *Forest and Range Practices Act* require the establishment of riparian *reserve* zones that *exclude* timber harvesting, and riparian *management* zones that *restrict* timber harvesting, in order to protect riparian and aquatic habitats.

To account for riparian areas in the Lakes timber supply analysis, five percent of the timber harvesting land base was excluded for riparian reserve zones and two percent for riparian management zones. The total reduction was 44 407 hectares of the timber harvesting land base. I am satisfied that reductions applied in the base case are acceptable representations of riparian management in the Lakes TSA.

Existing forest inventory

- status of current inventory

A new Vegetation Resource Inventory file that reclassifies and updates the forest cover is only available for a portion of the TSA and has not yet been verified for accuracy. As a result, the TSR 2 Forest Cover Inventory File (FC1) was used with heights, stocking class and ages projected to December 31 1998. The file accounts for significant harvesting and other disturbances up until December 1994. Due to time limitations to complete this analysis, the inventory file could not be updated for depletions through the conventional update process. As a result, the analysis accounted for harvest depletions and stand growth to 2003 by 'harvesting' and 'ageing' in the timber supply model.

In 1997, the Ministry of Forests' Resources Inventory Branch completed an inventory audit for this TSA. The audit compared measured stand volumes to inventory volumes for stands greater than 60 years old and found no difference between the two sets of volumes. I am satisfied that the existing inventory on which the timber supply analysis was based is reliable for strategic planning purposes, represents the best available information, and is therefore adequate for use in this determination.

- volume estimates for existing natural stands

The Variable Density Yield Prediction (VDYP) model version 6.4a, developed and supported by the Ministry of Forests' Resources Inventory Branch, was used to estimate timber volumes for existing natural stands for the 2004 timber supply analysis for the Lakes TSA.

Since the 1997 audit showed no difference between the estimated mean mature volume obtained from the inventory and that obtained from the audit plots, I am satisfied that the volume estimates for existing mature stands used in the analysis are adequate for this determination.

Expected rate of growth

- estimates for site productivity

Inventory data includes estimates of site productivity for each forest stand, expressed in terms of a site index. The site index is based on the height of the stand as a function of its age, and is typically expressed in metres reached by the age of 50 years. The productivity of a site largely determines how quickly trees grow. This in turn affects the time seedlings will take to reach green-up conditions, the volume of timber that can be produced in regenerated stands, and the ages at which a stand will satisfy mature forest cover requirements and reach a merchantable size.

In general, in British Columbia, site indices determined from young and old stands may not accurately reflect potential site productivity. In young stands, growth often depends as much on recent weather, stocking density and competition from other vegetation, as it does on site quality. In old stands, which have not been subject to management of stocking density, the trees used to measure site productivity may have grown under intense competition or may have been damaged, and therefore may not reflect the true growing potential of the site. This has been verified in several areas of the province where studies—such as the Old-Growth Site Index (OGSI) 'paired plot' project and the 'veteran' study—as well as results from using the Site Index Biogeoclimatic Ecosystem Classification (SIBEC) suggest that actual site indices may be higher than those indicated by existing data from old forests. In recent years it has been concluded from such studies that site productivity has generally been underestimated by the inventory file data.

In 1996 a local paired-plot study was conducted in the Lakes TSA to investigate the reliability of inventory estimates of site indices from old-growth pine stands. The study found that site index estimates for managed pine-leading stands were greater than those for adjacent stands which were 140 years of age or older. The recommendations for site index adjustments from that study were included in the base case for the Lakes TSA to better reflect the productivity of regenerated stands on the appropriate sites.

More recently, site productivity assessment work has been carried under the Babine Enhanced Management Pilot Project and Morice/Lakes Innovative Forest Practices Agreement (IFPA) with the results of these studies generally supporting the findings of the previous paired plot study.

I am satisfied that site productivity estimates used in the base case for this TSA are appropriate and I make no adjustments to the projected timber supply.

- minimum harvestable ages

A minimum harvestable age is an estimate of the earliest age at which a forest stand has grown or will grow to a harvestable condition. The minimum harvestable age assumption mainly affects

when second growth will be available for harvest. This in turn affects how quickly existing stands may be harvested such that a stable flow of harvestable timber may be maintained.

Forest district staff reviewed cruise information to determine the minimum volume at which sawlog stands were harvested. Based on licensee performance, the minimum volume per hectare considered harvestable, provided utilization criteria are met, is 140 cubic metres per hectare for stands that were not moderately or severely attacked by the MPB. This minimum volume of 140 cubic metres per hectare was used to determine the minimum harvestable ages. For stands that were moderately or severely attacked by the MPB minimum harvestable ages were set at 60 years in the analysis, as these volumes would be lost if not harvested. For the moderately and severely attacked pine stands harvested at 60 years of age, the projected volumes harvested could be as low as 100 cubic metres per hectare.

In the analysis, it was assumed that forest stands would be harvested in a sequence termed 'relative oldest first', and in many cases stands were not harvested until beyond minimum harvestable age due to management objectives for other resource values.

District staff advise me that the minimum harvestable ages assumed in the analysis are reasonable given current utilization and minimum operable volumes. I am satisfied that the minimum harvestable ages represented in the analysis are indicative of reasonable assumptions of growth and yield, and are acceptable for use in the timber supply projections I have considered in this determination.

- shelf life

An important consideration in developing management strategies and determining harvest levels is the length of time beetle-killed trees will be merchantable, i.e. - the shelf life. The epidemic in the Chilcotin during the 1980s resulted in the continual harvesting of beetle-killed trees for over 20 years after the stands were attacked. However, for areas north of the Chilcotin the climate is noted to be wetter and wood decay is expected to occur faster than in the drier Chilcotin area. While beetle-killed trees may remain standing for over 20 years, their merchantability as sawlogs and recoverable lumber is projected to decline more quickly within the first few years as the trees dry and start to check. Ultimately shelf life will be based on a number of factors and will vary widely based on market prices, available milling technology and biological conditions.

In the base case (2004 beetle forecast) it was assumed that beetle-killed trees would be useful for 10 years. Input from the public suggested that the 10-year shelf life was too optimistic, whereas input from one oriented-strand-board manufacturer suggested a shelf life in excess of 15 years. Sensitivity analysis conducted on the base case showed that if the shelf life is increased it is possible to lower but extend the initial harvest level as there is more time to recover the dead trees. Conversely, if the shelf life is reduced there is less time to recover the same amount of dead trees. In the absence of any further data about the shelf life of beetle-killed trees in the Lakes TSA, I accept the assumptions in the base case as adequate for making this AAC determination. The assumptions about shelf life used in the analysis are noted as reflecting the experience and expectations of field staff who have been observing ongoing developments in the area in recent years.

(ii) the expected time that it will take the forest to become re-established on the area following denudation:

Regeneration delay

Regeneration delay is the time that elapses between when an area is harvested and when it becomes occupied by a specified minimum number of acceptable, well-spaced seedlings.

In the base case, a 15-year regeneration delay was applied to severely attacked pine stands that were not projected to be harvested prior to the end of the ten-year shelf life. It was assumed that these stands did not have enough sound volume to be considered merchantable so they were assigned an extended regeneration delay and assumed to re-grow as natural stands. For all stands other than severely attacked pine, a regeneration delay of one year was modelled. In practice, such stands are regenerated two years after harvesting using 1-year old seedlings.

The presence of advanced regeneration caused some staff to argue that there was no delay in regeneration for some stands and that those regenerating stands were in fact about ten years old already. However, it was pointed out that those understory stands were usually affected by diseases such as needle rust and mistletoe and will likely require rehabilitation in order to produce a viable, healthy future stand.

Sensitivity analysis showed that assumptions of longer regeneration delay in severely attacked pine stands do not affect timber supply projections as most severely attacked pine stands are harvested prior to the end of the 10 year shelf-life. I am satisfied that the regeneration assumptions used in the analysis are reliable for use in this determination.

Impediments to prompt regeneration

Despite the validity of the regeneration assumptions as described in the previous section, the response to the MPB infestation has the potential to adversely affect the regeneration delay period in some areas. In the effort to control the spread of the MPB, numerous small (less than one hectare) patches were created throughout the TSA. Licensees are not obligated to reforest small, isolated patches and this practice could reduce timber supply if the patches are numerous. In the base case it was assumed that all areas harvested are reforested within the regeneration delay period.

I was informed that since harvesting operations in the TSA have switched from beetle control mode to timber salvage mode, larger openings are created and these openings are being reforested within two years of harvest. As well, subsequent harvest operations adjacent to the small patches have led to the entire opening being reforested. I have therefore made no adjustments to timber supply to account for impediments to prompt regeneration.

Not-satisfactorily-restocked areas

Not-satisfactorily-restocked (NSR) areas are those where timber has been removed, either by harvesting or by natural causes, and a stand of suitable forest species and stocking has yet to be established. Areas where the standard regeneration delay has not yet elapsed after harvesting are considered 'current' NSR. Where a suitable stand has not been regenerated and the site was harvested prior to 1987, the classification is 'backlog' NSR.

Silviculture records indicate that there are approximately 9258 hectares of current NSR and 606 hectares of backlog NSR in the Lakes TSA.

In the analysis, all 'current' NSR was assumed to regenerate within the identified regeneration delays. It was also assumed that all backlog NSR would be restocked within 10 years.

From discussions with district staff I note that there is some uncertainty about the capability to reforest the backlog NSR. For the present determination I am prepared to accept the restocking assumptions as applied in the analysis, on the basis that the level of uncertainty in this factor is not sufficient to pose any appreciable risk to the projected timber supply.

Mortality in immature pine stands

In the base case it was assumed that stands younger that 60 years would continue developing with normal levels of mortality as projected in the growth models used by the BCFS. However staff have observed varying levels of mortality due to the MPB in pine-leading stands as young as 30 years. It is likely that ongoing beetle attack is more closely related to tree diameter rather than tree age. Even though the beetles do not thrive in these younger stands, their proximity to older pine stands that are the source of beetles, make these stands highly susceptible to the MPB.

Preliminary surveys in four landscape units in the TSA indicate that mortality levels due to MPB in immature pine-leading stands in the Lakes TSA could be as much as 45 percent. I would like staff to monitor this situation so that it can be better represented in future analyses. Higher than normal mortality levels in immature stands reduces timber supply in the mid- and long term, and I have taken this into account in my determination as discussed in 'Reasons for Decision'.

(iii) silvicultural treatments to be applied to the area:

Silvicultural systems

With the exception of the caribou areas and mule deer winter ranges, harvesting in the TSA is primarily by clearcutting. In beetle infested areas, clearcutting of the leave strips between previous clearcuts have created patch sizes ranging from 1000 to 3000 hectares. Such large patches are a direct result of having vast areas of dead and dying trees. At this time further thought needs to be given to the regeneration objectives for these large patches. If these large areas continue to be reforested with lodgepole pine, it may create one of the conditions—a source of food—for another MPB infestation 80 to 100 years from now. At this time it is not clear what represents the best strategy for species and densities. However, I certainly note that this current MPB infestation creates the obligation for forest managers to develop and consider options for designing and planning the structure and condition of the future forest. I urge forest managers to develop strategies for the future tailored to the TSA and the severity of the MPB infestation. These considerations are discussed further under *Forest stewardship principles.*

Rehabilitation programs

In general, rehabilitation programs are silvicultural treatments applied to areas with the intention of making them more productive and/or bringing those areas into the timber harvesting land base. There are no rehabilitation programs planned in the TSA for stands killed by the MPB but not harvested. I will discuss the potential for such activities further under *Forest stewardship principles.*

(iv) the standard of timber utilization and the allowance for decay, waste and breakage expected to be applied with respect to timber harvesting on the area:

Utilization standards

Utilization standards define the species, dimensions and quality of trees that must be harvested and removed from an area during harvesting operations. BCFS staff advise that the standards applied in the Lakes TSA were reflected in the analysis. I accept that the utilization assumptions used in the timber supply analysis are adequate for use in this determination.

Decay, waste and breakage

The VDYP model used to project volumes for natural stands incorporates estimates of the volumes of wood lost to decay, waste and breakage. Decay losses are built into the volume estimates, while standard waste and breakage factors are applied to the analysis in the development of VDYP yield curves. These estimates of losses have been developed for different areas of the province based on field samples. For regenerated stands, an operational adjustment factor (OAF2) is applied to account for anticipated decay, waste and breakage, and the value applied for OAF 2 in the Lakes analyses increased from zero through to 5 percent at the point where forest stands reached an age of 100 years.

Government has changed the standards for acceptable waste in stands affected by the MPB epidemic. Under the new standards, licensees are allowed to leave as waste, nine cubic metres per hectare in dry sites, 15 cubic metres per hectare in transition sites, and 25 cubic metres per hectare in wet sites. The intent was that this waste, which is in addition to that accounted for in the yield model, would be charged to the AAC. District staff expressed differing interpretations regarding the intent of the communication on this matter and reported that the additional waste may not be charged to the AAC. Since this additional waste is part of the timber supply projected for the TSA I would have expected that it would be charged against any AAC that I set for this unit. In light of this observation, I have raised this issue provincially with the appropriate policy staff and asked that it be reviewed and the policy direction clarified and confirmed.

(v) the constraints on the amount of timber produced from the area that reasonably can be expected by use of the area for purposes other than timber production:

Forest stewardship principles

The Ministry of Forests is required under the *Ministry of Forests Act* to manage, protect and conserve the forest and range resources of the Crown and to plan the use of these resources so that the production of timber and forage, the harvesting of timber, the grazing of livestock and the realization of fisheries, wildlife, water, outdoor recreation and other natural resource values are coordinated and integrated. Accordingly, the extent to which integrated resource management (IRM) objectives for various forest resources and values affect timber supply must be considered in AAC determinations.

During the past several years with the increasing spread of the beetle infestation in the province, forest practitioners have been contemplating the question of stewardship principles that might be different from standard approaches when faced with catastrophic events and potentially large salvage programs. Last spring, when the need for an expedited timber supply review was announced by government, I asked my staff in the Forest Sciences Section to further research this question.

The results of their investigation lead to the paper "Forest Stewardship in the Context of Large — Scale Salvage Operations", which was attached to the public discussion paper released on June 10, 2004. The paper contains a number of recommendations designed to better inform decisions about harvest level increases and potentially future forest practices that might be different than current practices.

In preparation for the expedited timber supply reviews, timber supply analysts thoroughly reviewed the recommendations and where possible they included them in the *2004 beetle forecasts*. In the following sections — *cutblock adjacency, forest cover and green-up, and stand level biodiversity*, I have further discussed my consideration and accounting of the recommendations as they apply to the timber supply and harvest levels.

As the stewardship paper outlines, some contend that the magnitude of the current outbreak is at least partially the result of human influence on BC's pine forests, principally due to forest fire suppression (Stadt 2002, Taylor and Carroll 2003). Others contend that the outbreak is a "natural" event (Hughes and Drever 2001). If so, then the large areas of partially dead forests created by the outbreak are within the "range of natural variability" (Swanson et al. 1994, Wong and Iverson 2004).

I do not believe that anyone can profess to know exactly what caused the expansive nature of the infestation. I am informed about the increased amount of mature lodgepole forests due in part to forest fire suppression in the province over the last century, and that warmer weather has increased the historic range of the pine beetle in BC. However, these events are only available for our recent recorded history, about the last one hundred years. It is unknown if these events have combined in such a manner in previous centuries. I note that the Sierra Club claims that the forest stewardship paper fails to address the underlying causes of the infestations. While it is difficult to determine the exact causes, forest researchers and practitioners are trying to understand the nature of the epidemic and develop adaptive forest management practices in response to it.

The infestation in the Lakes TSA is particularly severe since its has such a significant component of near mature and mature lodgepole pine stands. Since most of the stands are primarily comprised of pine, it is possible that few live, mature pine trees will remain once the infestation has ended. Given this high degree of projected impact, the current infestation will have a large impact on the environment whether the trees are salvaged or remain unharvested.

The stewardship paper recommends that during large-scale salvage operations, large openings (> 1,000 hectares) will be appropriate, provided that they are designed to respect existing land-use planning objectives. Current forest practices and policies state that larger openings in natural disturbance types (NDTs) with historic large disturbance patterns such as found in the Lakes TSA, are permissible. Therefore the recommendation for larger openings requires no further policy change. However, the recommendation to require proportionately larger reserves or legacies of unharvested areas in the openings (up to 25 percent in the case of 1000-hectare openings) is not current practice. As well, the recommendation to increase the legacies of coarse woody debris and their spatial distribution to represent the "matrix" of adjacent forests is not required as part of current practice. I have discussed coarse woody debris further below under *stand-level biodiversity*.

In the timber supply analysis, the most significant variance from current practice was the increase in the amount of retention. This variance accounts for the stewardship recommendation to increase the size of reserves since it was assumed that most openings would also be larger. For the moderately and severely impacted pine stands where the large openings are expected, the overall retention level assumed in the base case was 20 percent (in TSR2 the retention level was

about 8 percent). Without this higher retention level, the harvest forecast would have been correspondingly higher than reported.

There are a number of other recommendations that although not directly accounted for in the analysis are operationally important, such as recommendations to develop strategies for appropriate access management, rehabilitation of some areas, hydrologic stability, planting regimes (species diversity), and the development and implementation of a long-term monitoring program.

The Ministry of Water, Land and Air Protection (WLAP) expressed concern about the lack of information to predict impacts of such a massive beetle infestation and subsequent salvage harvesting on non-timber values, especially where there has already been extensive harvesting. In particular, they noted the lack of information on the risks associated with changes to hydrology, e.g., increased peak flows, changes to timing of water delivery to streams, and increased water yield affecting water quality, quantity, fish and aquatic organisms; changes to sedimentation and stream morphology; and changes to habitats of species at risk and associated predators.

Although WLAP staff note support of the conservation values as reflected in the timber supply analysis, they submit that it is more important to understand how the conservation concepts will be applied on the ground. They recommend the development, testing, application and monitoring of methods and tools to decide where and when not to harvest (i.e. - to retain, protect or conserve non-timber values).

I note that some public comments stated the proposed changes are not contained in the *Forest and Range Practices Act* and that the MoF must attempt to assess the potential combined effects of large-scale salvage operations and the outbreak before committing to these changes. Some questioned the wisdom of additional forest cover requirements in a salvage scenario, especially given the size of the unsalvaged losses. Others commented that managing for biodiversity by applying higher retention levels is a sound strategy.

The Sierra Club noted that it seems clear that the forest stewardship proposal will inform ministry managers, but that it is not clear how it will form the basis of new policies or operational constraints. Also, they stated that the stewardship paper makes reference to monitoring the ecological effects of the large-scale salvage operations, but leaves out details as to which ministry will be responsible for monitoring.

In summary, I accept that the epidemic represents a catastrophic event and regardless of whether it is caused by natural or human-influenced events, it is evident that forest managers must consider new forest management strategies and responses to the ongoing epidemic. I understand that the Provincial Mountain Pine Beetle Coordinator is currently developing strategies regarding implications to land use planning, forest practices and the stewardship recommendations, as well as reforestation and rehabilitation programs. These strategies are essential for the implementation of any large salvage program.

For the purpose of this decision, I have decided to reflect the stewardship recommendations as modelled in the base case. While I acknowledge that they are not mandatory, I feel it is appropriate to consider their implications in the decision in order to ensure that adequate opportunity is given to other government decision makers to consider how to respond to this new information. This seems more reasonable in the short term rather than precluding its consideration by implementing an uplift that would compromise their possible attainment. In the meantime, I strongly encourage the appropriate policy analysis and resolution of how to consider this information from an operational perspective through the new *Forest and Range Practices Act*. This will be discussed further under 'Reasons for Decision'.

- cutblock adjacency, forest cover and green-up

To manage for resources such as water quality, wildlife and aesthetics, and to avoid concentrating harvesting-related disturbance in particular areas, operational practices limit the size and shape of cutblocks. As well, there are rules governing maximum disturbances (areas covered by stands of less than a specified height), and prescribing minimum green-up heights required for regeneration on harvested areas before adjacent areas may be harvested. Green-up requirements ensure maintenance of water quality, wildlife habitat, soil stability and aesthetics. Adjacency, green-up and forest cover objectives guide harvesting practices to provide for a distribution of harvested areas and retained forest cover in a variety of age classes across the landscape.

In the analysis, for the integrated resources management (IRM) zone (the zone least constraining on timber supply), which covers 44 percent of the timber harvesting land base, a constraint was applied requiring at least 67 percent of the forest cover to be at least 3 metres tall at all times. To facilitate the salvage of timber killed by the MPB, the requirement for cutblock adjacency in moderately and severely attacked pine stands in the IRM zone was waived for 30 years. After 30 years this requirement, along with all the others, was in effect for the remainder of the planning horizon. Sensitivity analyses showed that if the cutblock adjacency requirement was waived for only 10 years, the impact on timber supply in the second decade – when the constraint took effect– was negligible. This was because the pine stands could not be harvested due to other forest cover constraints.

Other specific cover constraints were applied to reflect particular objectives for moose habitat, caribou habitat, mule deer winter range, and scenic values, as detailed in the appropriate sections below. To ensure adequate representation of requirements for landscape-level biodiversity, the modelling assumptions in the analysis were consistent with the Lakes LRMP.

Some members of the public commented that assumptions concerning cutblock adjacency as used in TSR2 are no longer valid, whereas others argue that no scientific rationale was provided for the creation of large openings. The Sierra Club suggested that assumptions in the timber supply analysis should reflect the range of natural variability for the central interior of the province.

In considering the appropriateness of the forest cover assumptions in the analysis generally, I note that the constraints applied for multiple-use areas, scenic areas and caribou habitat were consistent with the LRMP and are therefore suitable for use in this determination. I am also satisfied that the waiving of adjacency requirements in the short term for MPB management and the creation of large patches is appropriate for the purposes of salvaging dead timber and I make no further adjustments to the base case timber supply. As I have previously acknowledged in the Forest stewardship principles, the base case reflects additional retention objectives that in fact do constrain short-term timber supply as a result of the forest stewardship considerations.

- visually sensitive areas

Careful management of scenic areas along travel corridors and near recreational sites, parks and major communities, is an important IRM objective that requires visible evidence of harvesting to be kept within acceptable limits in specified areas. Currently, the Code provides for scenic areas to be identified and made known, and for visual quality objectives (VQOs) to be established to limit the amount of visible disturbance permitted in sensitive areas. Visual landscape inventories are carried out to identify those areas of the province that are visually sensitive, and appropriate visual quality classes (VQCs) are recommended—for example 'Significant visual retention,' 'Visual retention,' 'Significant visual partial retention,' 'Visual partial retention'—to identify levels of alteration appropriate to those areas. Guidelines to meet the VQOs include setting a maximum percentage of a specified area or 'viewshed' that is allowed to be harvested at any one

time, and setting a 'visually effective green-up' or 'VEG' height at which a stand of reforested timber is perceived by the public to be satisfactorily greened-up.

Visually sensitive scenic areas that have been made known in the Lakes TSA represent 20 percent of the total TSA land base. Objectives have been specified for each of these areas. For example, to reflect the requirement that visible evidence of harvesting be kept within the specified limits in the visual partial retention areas, no more than 12.6 percent of the viewshed can be covered with trees less than four metres tall.

The Lakes LRMP acknowledged that salvage harvesting as a result of catastrophic events may from time to time compromise visual quality. The LRMP Monitoring Committee recognized that the current beetle epidemic would compromise visual quality and agreed with the District Manager that a relaxation of visual quality objectives was reasonable. To account for this relaxation in the analysis the maximum allowable disturbance in significant visual retention and visual retention areas has been increased from 3.4 and 2.3 percent respectively to 12.6 percent. As well, the maximum allowable disturbance in significant visual partial retention and visual partial retention areas has been increased from 12.6 and 10.7 percent respectively to 25 percent. This increase in maximum allowable disturbances was applied for 20 years in the base case and resulted in higher levels of timber supply in the short term.

In this TSA, with vast areas of beetle-killed forest, dead trees are generally not being left to satisfy the visual quality objectives. However, staff have advised that where possible dead trees, often in combination with other species, are left to satisfy biodiversity objectives (forest stewardship principles) and this practice also provides benefits related to visual quality. The rationale for leaving trees to meet VQOs was developed during a period when operations were harvesting, or leaving, live trees. Now that harvesting operations are primarily directed at harvesting or leaving dead trees, I urge staff from the Ministry of Forests, Ministry of Sustainable Resource Management, and the Ministry of Water, Land and Air Protection to reconsider whether leaving dead trees do indeed meet the objectives for VQO (as well as for wildlife, biodiversity and riparian area management).

The current timber supply analysis accounts for all visually sensitive areas now made known to licensees, and reflects all the management constraints to which licensees are presently required to adhere. I therefore consider that for the purposes of this determination the constraints on timber supply from areas currently managed for visual sensitivity have been modelled appropriately in the analysis.

- identified wildlife

Identified Wildlife are those wildlife species and plant communities that have been approved by the Ministry of Water, Land and Air Protection as requiring special management. On February 19, 1999, the province announced its Identified Wildlife Management Strategy (IWMS) for dealing with endangered, threatened, vulnerable, and regionally significant species that have not been accounted for by existing management strategies for biodiversity, riparian management or ungulate winter range, or through the application of other forest cover constraints.

A number of the species-at-risk listed under the Forest Practices Code are found in the Lakes TSA, including bull trout, American bittern, sandhill crane, trumpeter swan, northern goshawk, fisher, grizzly bear and mountain goat. Aside from forest cover constraints applied to protect grizzly bear habitat, no land base reductions or specific constraints on timber supply were applied to represent the special management required for these red- and blue-listed species under the approved provincial strategy. The strategy allows for up to a one-percent impact on the projected

timber supply from these requirements, and I have taken this into account in my determination as discussed under 'Reasons for Decision'.

- stand-level biodiversity

Biological diversity, or biodiversity, is defined as the full range of living organisms, in all their forms and levels of organization, and includes the diversity of genes, species and ecosystems, and the evolutionary and functional processes that link them. In practice, biodiversity in a given management unit is assessed and managed at the stand and landscape levels.

Stand-level biodiversity has two components. The first is for wildlife trees either dispersed throughout the cutblock or in wildlife tree patches (WTP) within the cutblock and in adjacent areas to provide structural diversity and wildlife habitat. The other provision for stand-level biodiversity is the retention of coarse woody debris throughout the cutblock.

District staff advise that there are large amounts of coarse woody debris left after harvesting—particularly due to current utilisation practices —but that this debris is usually at roadside rather than distributed throughout the cutblock. Licensees often burn this debris whereas landscape ecologists indicate there would be ecological benefits to having it distributed throughout the cutblock.

As described under *forest stewardship principles,* it was recommended that the level of in-block retention should increase as block size increases and should vary up to 25 percent of total block volume. In the analysis, a retention level of 20 percent was modelled for moderately and severely infested pine stands since it was assumed that salvage blocks would be quite large. In the remainder of the IRM zone the yield curves were reduced by two percent to account for WTPs because it was assumed that the non-timber harvesting land base would provide approximately two thirds of the requirements for WTPs. For TSAs in the interior of the province it is usually assumed that the non-timber harvesting land base would provide approximately one half of the requirements for WTPs. In the Lakes TSA—where the timber harvesting land base is about 79 percent of the productive forest—staff expect that the contribution to the WTP requirement from the non-timber harvesting land base would be less than one half. Therefore the level of retention in the IRM zone for areas other than for moderately and severely infested pine stands should have been higher than the two- percent modelled.

Even though it is not required in forest legislation or policy, I find that the levels of retention modelled for moderately and severely infested pine stands are reasonable. I encourage local forest managers to work together to find practical, cost effective ways to attain the higher retention levels modelled and to distribute it throughout the cutblock. For this determination I agree that the level of retention in the IRM zone for areas other than for moderately and severely infested pine stands should have been higher and I will discuss this further under 'Reasons for Decision'.

- landscape-level biodiversity

Achieving landscape-level biodiversity objectives involves maintaining forests with a variety of patch sizes, seral stages, and forest stand attributes and structures, across a variety of ecosystems and landscapes. Managing for biodiversity is based in part on the principle that this—together with other provisions in the Forest Practices Code, such as riparian management, maintenance of wildlife trees, and other forest cover objectives as discussed throughout this document—will provide for the habitat needs of most forest and range organisms.

The landscape-level biodiversity requirements for the Lakes TSA are outlined in the Lakes Higher Level Plan Order of July 2000. The Lakes Higher Level Plan order allows the Forest District

Manager and the Designated Environmental Officer to modify aspects of the LRMP under certain circumstances. In May 2003 these two statutory decision-makers agreed to deviate from the early seral stage requirements in the HLP to allow increased harvesting of beetle-infested pine stands in some parts of the TSA for a period of five years. This new direction was modelled in the base case.

In the previous analysis the forest in the non-timber harvesting land base was assumed to age in perpetuity without being disturbed by events such as fire and insects. As a consequence, an increasing proportion of the older forest required for landscape-level biodiversity was met from the non-timber harvesting land base as time went on. In the current base case, forest in the non-timber harvesting land base was not allowed to age beyond 280 years. Upon reaching this age, the forest in this part of the land base was "disturbed" and its age re-set to 30 years. This means that a greater proportion of mature and old forest required for landscape-level biodiversity now have to be met from the timber harvesting land base than previously.

While I recognise that both sets of modelling assumptions have their shortcomings, I am satisfied that the current base case assumptions adequately reflect the contribution of forests in the non-timber harvesting land base and I make no further adjustments to timber supply on this account.

Staff from MWLAP commented that they would support harvesting in the non-timber harvesting land base if that would lead to less road access in critical habitat elsewhere on the timber harvesting land base. I understand the concern about access especially in view of the proposed increase in harvesting and I urge District staff to work closely with other agencies and the forest industry in order to carefully manage access development (and deactivation where appropriate) in the coming years.

Others have pointed out that allowing lodgepole pine to age to 280 years is too long since pine normally die much sooner. I agree with this observation and I note that it may cause a very slight downward pressure on timber supply in the long term. However, since "disturbing" the non-timber harvesting land base did not affect the timber supply forecast significantly, I will not make any adjustments to the base case projections for this determination at this time.

Finally, I note the substantial amount of area and volume that was constrained and not available for harvesting as discussed earlier under *Forest stewardship principles*. These additional requirements—combined with all other land use and forest practices requirements, including stand- and landscape-level biodiversity objectives—do ensure that significant area is reserved from harvesting in order to meet important environmental objectives.

From all the foregoing, I am satisfied that the requirements for landscape-level biodiversity as prescribed in the Lakes LRMP, Higher Level Plan and the Forest Practices Code, even under the current conditions of extreme MPB infestation, have been respected and incorporated in the timber supply analysis.

(vi) any other information that, in the chief forester's opinion, relates to the capability of the area to produce timber;

First Nations considerations

Six First Nations (Cheslatta Carrier Nation, Burns Lake Band, Nee Tahi Buhn Band, Skin Tyee Band, Wet'suwet'en First Nation and Lake Babine Nation) have resident communities in the Lakes TSA. Other First Nations with asserted traditional territories which extend into the Lakes TSA are the Nadleh Whut'en, Stellat'en First Nation, Tlazt'en First Nation, Yekooche First Nation and

Ulkatcho. First Nations have generally stated they want opportunities to become more involved in management of the natural resources within their areas of interest. Considerable change has occurred whereby the First Nations are being encouraged to increase their participation within the forest sector. Currently there is an increasing involvement by First Nations in forest harvesting, primarily through the implementation of interim measures agreements and providing opportunities through Section 47.3 of the *Forest Act*. The current AAC uplift in the TSA has increased the opportunities for First Nations involvement.

Bands that hold timber tenures in the Lakes TSA include the following:

- The Cheslatta Carrier Nation signed a community forest pilot agreement October 2, 2002 with the Nadina Forest District. Under the agreement the Cheslatta Community Forest was awarded to the Cheslatta Carrier Nation. The timber harvesting land base of this community forest is estimated to be about 18 978 hectares. The Cheslatta CF areas were excluded from this timber supply analysis.
- The Burns Lake Band signed an interim measures agreement which has been replaced with a Forest Range Agreement (FRA) for 125,000 m^3 and revenue sharing over a five-year period.
- The Wetsuwet'en First Nation have signed an interim measures agreement for 75 000 m^3 over three years and have been offered a FRA in replacement. They are currently considering the replacement agreement, which will expand the access to volume an additional two years (50,000 m^3) and provide revenue sharing over the term of five years.
- A FRA has also recently been signed with the Moricetown Band for 462,665 m^3 and revenue sharing over the term of five years. A small portion of this volume may be harvested within the Lakes TSA.

- First Nations consultation

Prior to the release of the Public Discussion Paper on June 10, 2004, District staff provided early notification to the First Nations with asserted territories in the TSA advising them of the expedited TSR process and encouraging their opportunity to provide input. A second notification, a copy of the public discussion, and an offer to meet was also sent.

I note the level of participation of First Nations in timber harvesting activities (see section above) in the TSA. At this time, the nature, scope, and geographical location of potential aboriginal rights and title within the Lakes TSA remain inconclusive. To the extent that further information on aboriginal interests becomes available during the term of the new AAC, I will consider it in the next AAC determination. I encourage continued consultation with First Nations on operational activities to enable design and timing of forest operations to minimize and hopefully eliminate negative impacts on First Nations' interests.

As I have noted in my *Guiding principles with respect to First Nations*, the AAC that I determine should not in any way be construed as limiting the Crown's obligations as described in court decisions with respect to aboriginal rights and title. The AAC that I determine does not prescribe any particular plan of harvesting activity within the TSA by requiring any particular area to be harvested or not harvested.

As I make my AAC determination, I am mindful of the responsibility of other statutory decision-makers to administer the AAC in a manner consistent with other legislation and with relevant decisions of the courts respecting the interests of First Nations.

Land and resource management plans

Portions of plans arising from strategic land-use planning processes such as regional or subregional planning (e.g., land and resource management plans (LRMPs)) may be declared as higher level plans under the Forest Practices Code. A higher level plan defined under the Forest Practices Code establishes government's social, economic and environmental objectives, thereby setting the resource management context for developing subsequent operational plans.

The Lakes LRMP was approved by government in April 2000 and the HLP was approved later that year in July. Forest development in the TSA is required to be consistent with the Higher Level Plan as provided under the Forest Practices Code. In a letter to licensees, the District Manager confirmed the requirement to follow the objectives of the LRMP. As described earlier under *'landscape-level biodiversity'*, the Lakes LRMP allows the Forest District Manager and the Designated Environmental Officer to modify aspects of the LRMP under certain circumstances. In 2003 these two statutory decision- makers agreed to deviate from the early seral stage requirements in the HLP to allow increased harvesting of beetle-infested pine stands in some parts of the TSA.

The timber supply analysis and my considerations in this AAC determination assume consistency with the direction from the LRMP as representative of current management. The LRMP will soon undergo a review in accordance with the MPB action plan update for 2004. Scenic values, biodiversity, access management and wildlife habitat are some of the aspects that will be considered.

From detailed discussions with staff from the BCFS, MWLAP and MSRM, I am satisfied that the requirements of the LRMP—as these are currently understood and interpreted by those primarily responsible for its implementation—have been carefully and adequately represented in the timber supply analysis.

(b) the short and long term implications to British Columbia of alternative rates of timber harvesting from the area:

Alternative harvest flows

In public input, First Nations drew attention to the fact that the proposed AAC increase is clearly unsustainable, will lead to an economic 'boom' that will be 'difficult to scale back' and will not give future generations the same level of prosperity. Generally, I agree with these observations, although I would add that scaling back will be driven by an overall reduction of harvestable mature timber. I also note that the lower future harvest level is basically a result of the beetle mortality rather than the short-term salvage program. In my determination I have been mindful of these concerns and have considered them in context of the urgency of the need to salvage the mortality and to minimize the overall damage brought about by the MPB in the TSA.

Specifically, in the timber supply analysis the elevated harvest level is indicated to be sustained for only five years. I have noted elsewhere that during that time, even with elevated harvest levels, it could be possible for the MPB to attack all susceptible lodgepole pine stands on the timber harvesting land base. The elevated harvest levels now under consideration are not contemplated as sustainable levels; rather they are temporary, extraordinary measures designed to deal with an extraordinarily widespread MPB attack, and to contain any negative consequences to the extent possible. Increased levels of socio-economic activity will occur for the duration of the elevated harvest and will necessitate adjustment when the harvest level subsequently declines. However, the harvesting and reforestation activities now contemplated are expected to leave the

forests in a better, less damaged condition for the future than if no additional effort were made at this time to salvage the killed timber. Thus, as further discussed throughout this document, despite the noted concerns I have considered a temporary increase in harvest level to be an appropriate response to the current epidemic infestation.

(c) Repealed.

(d) the economic and social objectives of the government, as expressed by the minister, for the area, for the general region and for British Columbia;

Minister's letter and memorandum

The Minister has expressed the economic and social objectives of the Crown for the province in two documents to the chief forester—a letter dated July 28, 1994, (attached as Appendix 4) and a memorandum dated February 26, 1996, (attached as Appendix 5). This letter and memorandum together include references to forest investments, forest stewardship, a stable timber supply, and allowance of time for communities to adjust to harvest-level changes in a managed transition from old-growth to second-growth forests, so as to provide for community stability.

The Minister stated in his letter of July 28, 1994, that "any decreases in allowable cut at this time should be no larger than are necessary to avoid compromising long-run sustainability." He placed particular emphasis on the importance of long-term community stability and the continued availability of good forest jobs. To this end he asked that the chief forester consider the potential impacts on timber supply of commercial thinning and harvesting in previously uneconomical areas. To encourage this the Minister suggested consideration of partitioned AACs.

The government's objective with respect to reductions in AACs is not directly applicable in this TSA at this time as no immediate AAC reduction is contemplated. However, the temporary increase under consideration is projected to be followed by an equivalent decrease, and in determining this AAC I have been mindful of the government's objective with respect to the size of the eventual reductions.

With respect to commercial thinning, I have noted that this has been tried in the TSA, but that the economics are currently not advantageous. The Minister's memorandum addressed the effects of visual resource management on timber supply. In it, the Minister asked that pre-Code constraints applied to timber supply in order to meet VQOs be re-examined when determining AACs in order to ensure they do not unreasonably restrict timber supply. In the case of the Lakes TSA, as discussed under '*visually sensitive areas*', the LRMP provides flexibility to adjust the VQOs in response to the MPB epidemic.

Local objectives

The Minister's letter of July 28, 1994, suggests that the chief forester should consider important social and economic objectives that may be derived from the public input in the timber supply review where these are consistent with government's broader objectives.

In the abbreviated timber supply review process for the Lakes TSA, the BCFS provided opportunities for public review and comment on the *Expedited timber supply review for the Lakes, Prince George and Quesnel timber supply areas – Public Discussion Paper*, released in June 2004. Copies of the report were mailed to local governments and Members of the Legislative Assembly, First Nations and licensees, and made available to forest workers, environmental groups, ranchers, consultants and interested individuals in the Lakes and other

adjacent TSAs. Information meetings were offered, copies of the documents were provided to the public and local media, and their availability was advertised.

In response, many submissions were received, from the forest industry, local government, First Nations, interest groups and the general public. I have reviewed the submitted information. Wherever possible, I have attempted in the appropriate sections of this rationale to respond briefly to the views expressed, and consideration of this input has been an important component of this determination.

(e) abnormal infestations in and devastations of, and major salvage pregrams planned for, timber on the area.

Epidemic mountain pine beetle infestation

- the beetle

The mountain pine beetle (MPB), *Dendroctonus ponderosae* Hopkins (Coleoptera: Scolytidae) is widely considered to be the most damaging of all the insects that attack lodgepole pine in western Canada. The insect is a small, cylindrical-shaped bark beetle that kills mature trees by boring through the bark, mining the phloem—the layer between the bark and the cambium or inner wood of a tree—and interrupting the flow of nutrients up the tree stem. Details of its life cycle and its devastating power in destroying forests are reported in the *Mountain pine beetle, Forest Pest Leaflet 76*, a Pacific Forestry Centre publication, from which the following extract is taken:

> Tree foliage begins to dry out as soon as the conduction of water up the tree is interrupted. As a result, the color of the foliage on infested trees gradually changes from bright to dull green. This early symptom in the lower crown will often become visible 2-3 months after attack. However, more distinct color changes occur during the onset of the growing season the spring following attack. Most lodgepole pine change from yellowish green to an orangey red by July and rusty brown by late summer. At this time most of the beetles will have left the tree. Other tree species display varying color patterns: ponderosa pine seldom turns red but develops more of a straw color, while white pine tends to become bright red. With time, retained foliage color becomes more dull, and most of the foliage drops in 2-3 years; this will vary from species to species and with weather conditions. These rapid and distinct color changes are used to schedule aerial mapping of recently attacked trees.

- assessment of the mountain pine beetle epidemic

The MPB thrives in forests of mature lodgepole pine, and in the past two decades has widely infested a vast area in central British Columbia. As I noted earlier in this document, a large proportion of the Lakes TSA's timber harvesting land base supports forest stands aged 60 years and higher, the majority of which are pine forests and highly susceptible to attack by the MPB.

Due to this abundant host and to a series of mild winters that have failed to kill the MPB larvae, the infestation has spread rapidly over the past ten years to reach epidemic proportions today in the Lakes TSA. The last major infestation was in the Chilcotin during the 1980s and covered approximately 400 000 hectares. Beetle-killed trees were harvested as merchantable sawlogs and pulp (chip) fibre for many years after the infestation was halted by cold winter weather. The current outbreak is believed to have started around 1994. While it increased steadily for a number of years, it has only been in the last two to three years that the outbreak has expanded so rapidly.

By 2002, the outbreak had exceeded all previous records and continues to grow at epidemic levels. In April 2004, the BCFS Research Branch reported the *Provincial Level Projection of the Current Mountain Pine Beetle Outbreak: An Overview of the Model (BCMPB) and Draft Results of Year 1 of the Project.* This research was supported by the Mountain Pine Beetle Initiative (MPBI) of the Canadian Forest Service and the BC Forest Service. One of the key aspects of the provincial-level MPB project was the development of a MPB population prediction system. The data shown in Table 1 and repeated below was derived from that draft report. It is expected that in 2005 (as a result of the 2004 flight) there will be about 25 million cubic metres of merchantable pine killed in the Lakes TSA as a result of the beetles emerging from their brood trees and infesting new host trees this summer. District staff report that the current level of mortality in the Lakes TSA may be about 25 percent greater than projected in Table 1. Accordingly, they project a mortality of about 30 million cubic metres for 2005 rather than the 25 million shown in the table. From my inspection of the TSA, I accept this assessment of mortality and I will discuss this further under 'Reasons for Decision'.

Merchantable volume (millions m3) of beetle-killed pine on the timber harvesting land base.

TSA	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Lakes	0.3	1	4	9	16	21	25	30	34	38	42	46
PG	5	7	10	21	38	59	79	100	127	141	158	171
Quesnel	4	4	7	13	28	44	56	66	73	79	83	87
Total	**9**	**13**	**21**	**43**	**83**	**124**	**160**	**196**	**234**	**258**	**283**	**304**

The annual rate of kill for the three TSAs is expected to peak in 2007 as the availability of suitable host trees decreases. By 2010, the cumulative volume of pine killed in the Lakes TSA is projected to be 46 million cubic metres.

- *'controlling' the MPB*

As noted in the *Mountain pine beetle, Forest Pest Leaflet 76*, several control methods may be effective for lower levels of infestation. Pheromones may be used to prevent the spread of beetles outside the affected area or to create trap trees to attract beetles. Individual 'brood trees' may be felled and burned, and approved pesticides may be applied under permit, before the MPB larvae have had time to mature and spread. A number of these methods have been applied in the Lakes TSA.

However, as noted in the *Mountain pine beetle, Forest Pest Leaflet 76*, these methods become ineffective at higher levels of infestation.

> At intermediate infestation levels (up to about 100 trees per patch), small-patch logging can be used if good access is in place, and if beetle attack is concentrated naturally or through the use of pheromone baits. Beyond the intermediate stage, and when infestations exceed 10 ha [hectares], control becomes increasingly more difficult. In larger infestations the rate and range of beetle dispersion increases and any effective control program will require very extensive ground surveys to locate the green, newly attacked trees. Consequently, the only practical control measure at this stage is clearcutting well beyond the areas having red trees in order to remove trees containing beetles.

During the past two years in the Lakes TSA, the latter measure—'clearcutting well beyond the areas having red trees in order to remove trees containing beetles'—was the preferred option. This action did not *eliminate* the infestation, which at its current level could only be achieved by a population collapse, either from very cold weather or from complete infestation of all susceptible host trees. However, it was hoped that intense control efforts focussed on the removal of active infestations could *slow* the MPB's population expansion, and remove the large numbers of dead and dying trees from the landscape and salvage their commercial value while it remains. As can be seen from the above table, the current level of control was insufficient to prevent the infestation's serious threat to all susceptible stands in the TSA.

- current management strategy

Regional and district staff of the BCFS, and the local forest industry have been actively working to control and manage the MPB infestation. Since 1998, the management strategy has been to direct harvesting to infested stands as a priority so that the remaining stands can continue to contribute to achieving the objectives of the LRMP. In response to the growing MPB epidemic the province developed a bark beetle strategy in 2001. This strategic plan consisted of the appointment of a beetle management coordinator; introduction of a bark beetle regulation; amendments to the stumpage system; provision for transferring cutting rights across TSA boundaries; administrative efficiencies; increased cut control flexibility; coordination of fire protection; improved transportation infrastructure; and pursuit of federal emergency funding.

The current strategy recognises that the TSA is over-run by the MPB and the harvesting emphasis is now on recovering the economic value of the killed timber rather than attempting to control the spread of the beetle. Harvesting is heavily concentrated on salvaging dead and dying pine with only incidental harvesting of other species. Recent volume billings reflect this pine emphasis with greater than 80 percent of the volume harvested being from pine.

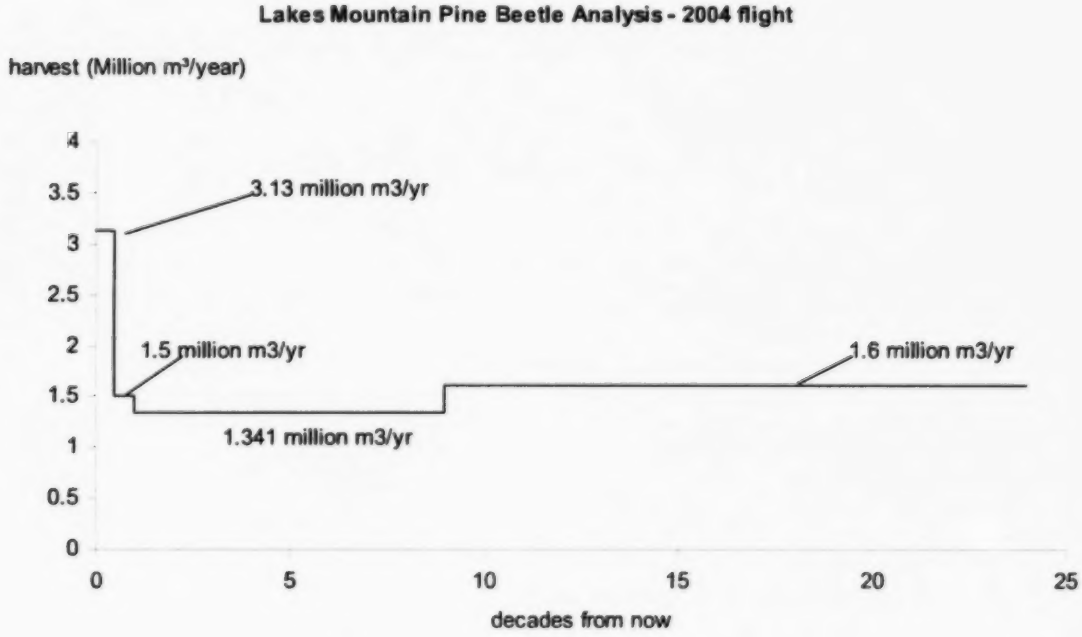
- timber supply analysis—assumptions and results

From the many complex assumptions on which the analyses were based and which I have reviewed in detail, the following are of particular note with respect to MPB management.

- The TSR2 inventory data was updated to reflect harvesting using harvest-billing information provided by district and region staff.
- For pine-leading stands with moderate and severe levels of attack, stand-level retention was increased to 20 percent (about 12 percent above TSR2 levels) and cutblock adjacency constraints were removed.
- All other forest cover constraints related to higher level plans, landscape-level biodiversity, visual quality, and wildlife habitat were applied.
- In the short term, the harvest targets pine stands with moderate and severe levels of attack first (worst first).
- It is assumed that beetle-killed wood could be used for 10 years and then considered unrecoverable thereafter.
- A 15-year regeneration delay was assumed to apply to severely attacked pine stands that are not harvested within the first 10 years. These stands do not retain enough sound wood to be considered merchantable after the shelf life has expired.

- Disturbance was modelled in areas outside the timber harvesting land base to ensure they would not become exceedingly old.

The figure below shows a harvest forecast based on the projected 2005 mortality level from this year's (2004) flight of beetles. The 2004 beetle forecast, which indicates that 3.13 million cubic metres is required to harvest the mortality in the moderately and severely attacked pine stands before they become unmerchantable, was chosen as the base case for this AAC determination.



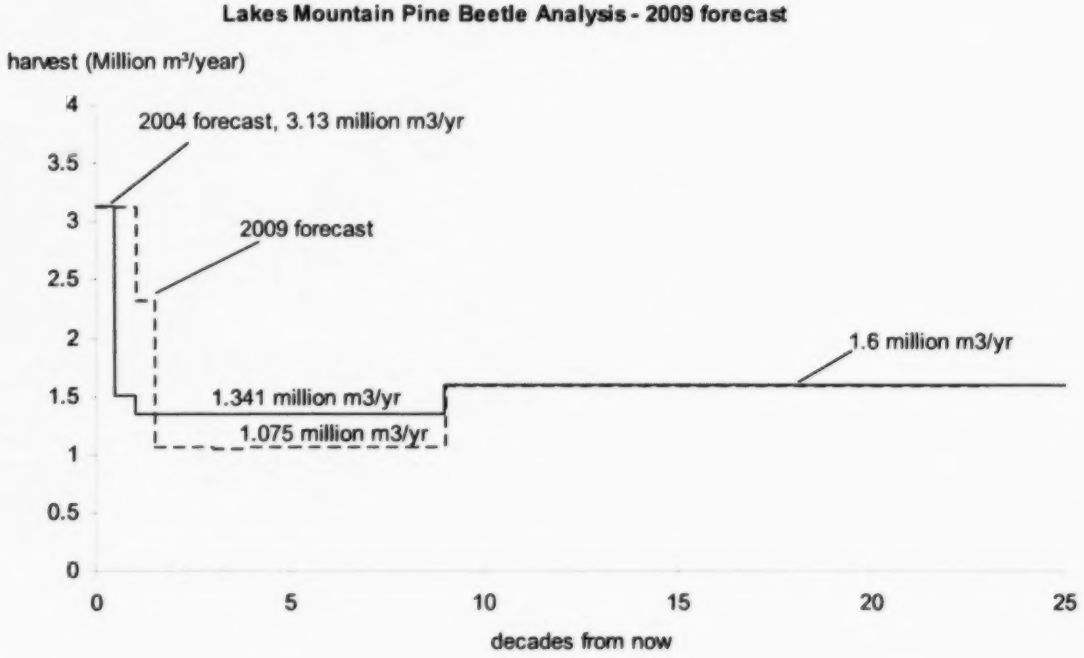
The total attacked volume reported for the 2004 flight (detectable in 2005) in the Lakes TSA is 25 million cubic metres. It was assumed in the 2004 beetle forecast that there will be no further mortality from 2005 onwards.

In the 2004 beetle forecast, the volume lost after allowing for stewardship reductions is projected to be 14.5 million cubic metres.

Of the 14.5 million cubic metres lost in the 2004 beetle forecast, 7.1 million occurs in low-impacted stands not prioritized for harvest. The remaining 7.4 million cubic metres are in moderate- and severely-attacked pine stands which were not projected to be harvested due to forest cover constraints (note: the cutblock adjacency constraints were removed for these stands but all other constraints were applied).

- timber supply analysis—alternative projections

An alternative timber supply projection was provided based on the assumption that pine mortality will continue as projected in Table 1 to the year 2010 (2009 flight damage). The figure below shows the results of this analysis.



A shelf life of 15 years was used for this forecast since much of the volume will be killed over the next 5 years and therefore shelf life has not started for the timber expected to be killed within the next 5 years.

All projections account for the requirements of the LRMP noted and discussed in other sections of this document. The presence of the MPB in the TSA means that significant reductions in the mid-term harvest level is inevitable under all forecasts. In view of the uncertainty in predicting the spread of the MPB, I note that if beetle damage continues as projected, the continuation of the base case harvest level is sufficient to salvage the resulting mortality.

In conclusion, in my determination of this AAC for the Lakes TSA I have relied extensively, and have placed considerable weight on, my considerations and conclusions in this section, as discussed further in 'Reasons for Decision'.

Reasons for Decision

In reaching my AAC determination for the Lakes TSA, I have considered all of the factors presented above, and I have reasoned as follows.

It is my view, and that of other staff, that the potential for the current epidemic MPB infestation to compromise the achievement of a range of forest management objectives in the TSA is related to the extent of the damage that the beetle is able to incur before its population collapses, either from a weather event (extreme cold at a critical time) or when all susceptible host stands have been attacked. For that reason, the curtailment of the spread of the epidemic infestation, and the salvage of large and growing areas of damaged timber—before serious losses occur to both commercial value and government revenues—have become urgent, complementary priorities in forest management objectives for the TSA.

Experience has shown, as documented in the *Mountain pine beetle, Forest Pest Leaflet 76*, given the current epidemic stage of the infestation, the only practical control measure for bringing about the required curtailment is 'clearcutting well beyond the areas having red trees in order to remove trees containing beetles'. The application of the current AAC to the harvesting of attacked stands has not kept pace with the beetle in recent years, as a result of which over 25 million cubic metres of affected timber now stand dead or dying in the TSA. The determination of the appropriateness of an increase in the harvest level—to remove the affected timber, to capture otherwise lost value, and to avoid extensive regeneration delays from residual unsalvaged areas—is therefore now urgent. In response to this urgency, the process leading to this AAC determination has been expedited and some components of the normal timber supply review process were abbreviated, as discussed earlier in this document under 'Expedited process for an urgent AAC determination to address the infestation'.

The expedited process leading up to my determination, however, has not constrained the rigour of my review of the factors required to be considered in an AAC determination under section 8 of the *Forest Act*. Staff of the Forest Service, MSRM and WLAP have made a significant effort to ensure the information considered in my review is an accurate representation of the facts. From my careful review of the information before me in this determination, I am satisfied that the full range of considerations required to be addressed has been comprehensively presented and assessed. Accordingly, my 'Reasons for Decision' are presented in the same manner as in any other determination, acknowledging the substantial focus on the urgency to consider the abnormal MPB infestation as provided under section 8(8)(e) of the *Forest Act*.

My considerations in determinations under section 8 typically identify various factors which, considered separately, indicate that the timber supply may actually be either greater or less than that projected in the reference or 'base case' forecast. Some of these factors can be quantified and their impacts assessed with some reliability. Others may influence timber supply by introducing an element of risk or uncertainty to the decision, but cannot be reliably quantified at the time of determination. These latter factors are accounted for in determinations in more general terms.

The following factors have been identified in my considerations as reasons why the timber supply projected in the reference forecast may have been over-estimated to a degree that may not be readily quantified with accuracy:

- *Mortality in immature pine stands:* There is evidence of trees in pine-leading stands younger than 60 years old being killed by the MPB. The base case only accounted for mortality in stands greater than 60 years old. Higher than normal levels of mortality in these stands

indicates the likelihood of an unquantified but substantial over-estimation in the projected mid-and long-term timber supply.

- *Stand-level biodiversity*: I agree that the level of tree retention in the IRM zone for areas other than moderately and severely infested pine stands should have been somewhat higher than modelled in the base case. I will therefore account for a slight over-estimation of timber supply in the mid- and long-term.

I have identified the following factors as indicative of potential over-estimations in the timber supply to degrees that may be quantified with some reliability:

- *Identified wildlife*: In view of the positive indications of red- and blue-listed species present in the Lakes TSA I am assuming a 1-percent overestimation in the timber supply throughout all periods of the base case forecast to account for future habitat designations for identified wildlife, even though some potential habitat provisions may overlap with existing constraints.

From reviewing all of my considerations documented above, including the above factors identifying the over-estimations in the projected timber supply, I have reasoned and concluded as follows.

In the mid and long term, timber supply is overestimated due to the mortality seen in immature pine stands and the need for more stand-level retention for wildlife tree patches. As well, timber supply is overestimated throughout the planning horizon by about one percent because the base case did not account for identified wildlife species. From this it is apparent that the harvest levels in the base case are slightly too optimistic in the short term and even more optimistic in the mid-term and long-term.

I also noted under *assessment of the mountain pine beetle epidemic* that the mortality figures developed by the BCFS Research Branch for the 2004 beetle flight are likely too low for the Lakes TSA. I agreed with estimates from District staff that mortality due to the MPB is more likely to be about 30 million cubic metres. As a result, the short-term harvest level required to salvage impacted pine stands should be somewhat higher than projected in the base case. I note however that in the base case (2004 flight) a large amount of moderate and severely attacked pine stands (7.4 million cubic meters) were not harvested due to constraints for non-timber values. Accordingly, I expect that much of this additional volume (5 million more than the base case assumed) will not be accessible due to the need to preserve non-timber values.

There is also uncertainty whether the MPB infestation will continue to 2010 as projected in Table 1. I am fairly confident, however, that the mortality projected to occur as a result of this summer's flight (trees attacked this summer will be detectable in the spring of 2005) will in fact occur because the past winter was relatively mild and the beetle flight for this year has already occurred. This decision is therefore premised on salvaging the mortality in the Lakes TSA projected by District staff for 2005.

In context of the current catastrophic MPB infestation it is not useful to attempt to place any finer point on these generalised considerations, beyond the conclusion that nothing in the considerations I have reviewed indicates that the forecasts presented cannot be relied on as providing a reasonable understanding of the potential effects of the MPB, and its management, on the projected timber supply in the TSA.

In accordance with these projections I therefore conclude as follows. By the year 2005 the cumulative total amount of dead timber in the Lakes TSA attributable to the MPB will be about 30 million cubic metres. The amount of standing dead timber will be somewhat less because of salvage activities during the past few years. Given recent conditions it is quite likely that mortality will increase. I also note that significant additional volume was constrained in the analysis to reflect a reasonable projection of higher levels of retention due to the catastrophic impacts of the beetle infestation. The base case and sensitivity analyses have shown the feasibility of increased harvests as part of a sound strategic approach to the timber supply in the TSA that includes consistency with the biodiversity objectives of the LRMP. It is my determination therefore that an AAC of 3.162 million cubic metres, which is an increase of 200 000 cubic metres at this time, is both possible and necessary.

If the MPB continues to expand, the projections in the 2009 beetle forecast show that an AAC of 3.162 million cubic metres is adequate to salvage the projected mortality. On the other hand, if the MPB undergoes a population crash, the entire increase may not be required for the duration of the effective term of the AAC. For this reason, I will request that BCFS staff monitor and keep me apprised of the condition of the infestation, on the understanding that, as and when appropriate, I may revisit this determination at a date earlier than required by statute, for the purpose of determining whether a reduction is necessary.

As noted in the *Forest stewardship principles* section, I have decided to reflect the stewardship recommendations as modelled in the base case. While I acknowledge that they are not mandatory, I feel it is appropriate to consider their implications in this decision in order to ensure that adequate opportunity is given to other government decision-makers to consider how to respond to this new information. This seems more reasonable in the short-term rather than precluding its consideration by implementing an increase that would compromise their possible attainment. In the meantime, I strongly encourage the appropriate policy analysis and resolution of how to consider this information from an operational perspective through the new *Forest and Range Practices Act*.

Determination

Having considered and reviewed all the factors as documented above, including the risks and uncertainties of the information provided, it is my determination that a timber harvest level that (i) accommodates objectives for all forest resources during the next five years, that (ii) reflects current management practices as well as the socio-economic objectives of the Crown, and (iii) provides for the timely salvage of timber damaged by the MPB while (iv) diminishing the overall extent of future damage by the MPB, can be best achieved in the Lakes TSA at this time by establishing an AAC of 3 162 000 cubic metres.

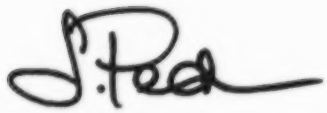
This AAC volume excludes all volumes in issued woodlot licences. This new AAC becomes effective October 1st, 2004, and will remain in effect until another new AAC is determined, which must take place within five years of the present determination.

The following observations are important to, and form an integral part of this determination. The previous 2001 increase and the new increase should be targeted in pine stands that have been impacted by the beetle infestation, with the 2004 increase primarily aimed at mortality in the moderately and severely impacted pine stands. Staff of the BCFS will monitor and apprise the chief forester of the condition of the MPB infestation, on the understanding that, if and when required, this determination may be revisited at a date earlier than required by statute.

Implementation

In the period following this decision and leading to the subsequent determination, I encourage BCFS staff to undertake the tasks and studies noted below that I have also mentioned in the appropriate sections of this rationale document. I recognise that the ability of staff to undertake these projects is dependent on available staff resource time and funding. These projects are, however, important in helping to reduce the risk and uncertainty associated with key factors that affect the timber supply in the TSA.

1. Examine the issue of waste in excess of that accounted for in the yield models so that it is charged to the AAC.
2. Monitor the MPB infestation with respect to (i) the ongoing achievement of LRMP objectives and (ii) the likely need for continued elevated harvest levels.
3. Encourage the resolution of how to implement the stewardship recommendations (from the paper "Forest Stewardship in the Context of Large - Scale Salvage Operations) operationally and in the context of the *Forest and Range Practices Act.*



Larry Pedersen
Chief Forester

September 14, 2004

Appendix 1: Section 8 of the *Forest Act*

Section 8 of the Forest Act, Revised Statutes of British Columbia 1996, c. 157 Consolidated to November 4, 2003, reads as follows:

Allowable annual cut

8 (1) The chief forester must determine an allowable annual cut at least once every 5 years after the date of the last determination, for

(a) the Crown land in each timber supply area, excluding tree farm licence areas, community forest agreement areas and woodlot licence areas, and

(b) each tree farm licence area.

(2) If the minister

(a) makes an order under section 7 (b) respecting a timber supply area, or

(b) amends or enters into a tree farm licence to accomplish a result set out under section 39 (2) or (3),

the chief forester must make an allowable annual cut determination under subsection (1) for the timber supply area or tree farm licence area

(c) within 5 years after the order under paragraph (a) or the amendment or entering into under paragraph (b), and

(d) after the determination under paragraph (c), at least once every 5 years after the date of the last determination.

(3) If

(a) the allowable annual cut for the tree farm licence area is reduced under section 9 (3), and

(b) the chief forester subsequently determines, under subsection (1) of this section, the allowable annual cut for the tree farm licence area,

the chief forester must determine an allowable annual cut at least once every 5 years from the date the allowable annual cut under subsection (1) of this section is effective under section 9 (6).

(3.1) If, in respect of the allowable annual cut for a timber supply area or tree farm licence area, the chief forester considers that the allowable annual cut that was determined under subsection (1) is not likely to be changed significantly with a new determination, then, despite subsections (1) to (3), the chief forester

(a) by written order may postpone the next determination under subsection (1) to a date that is up to 10 years after the date of the relevant last determination, and

(b) must give written reasons for the postponement.

(3.2) If the chief forester, having made an order under subsection (3.1), considers that because of changed circumstances the allowable annual cut that was determined under subsection (1) for a timber supply area or tree farm licence area is likely to be changed significantly with a new determination, he or she

(a) by written order may rescind the order made under subsection (3.1) and set an earlier date for the next determination under subsection (1), and

(b) must give written reasons for setting the earlier date.

(4) If the allowable annual cut for the tree farm licence area is reduced under section 9 (3), the chief forester is not required to make the determination under subsection (1) of this section at the times set out in subsection (1) or (2) (c) or (d), but must make that determination within one year after the chief forester determines that the holder is in compliance with

section 9 (2).

(5) In determining an allowable annual cut under subsection (1) the chief forester may specify portions of the allowable annual cut attributable to
  (a) different types of timber and terrain in different parts of Crown land within a timber supply area or tree farm licence area, and
  (b) different types of timber and terrain in different parts of private land within a tree farm licence area.
  (c) Repealed. [1999-10-1]

(6) The regional manager or district manager must determine an allowable annual cut for each woodlot licence area, according to the licence.

(7) The regional manager or the regional manager's designate must determine a rate of timber harvesting for each community forest agreement area, in accordance with
  (a) the community forest agreement, and
  (b) any directions of the chief forester.

(8) In determining an allowable annual cut under subsection (1) the chief forester, despite anything to the contrary in an agreement listed in section 12, must consider
  (a) the rate of timber production that may be sustained on the area, taking into account
    (i) the composition of the forest and its expected rate of growth on the area,
    (ii) the expected time that it will take the forest to become re-established on the area following denudation,
    (iii) silviculture treatments to be applied to the area,
    (iv) the standard of timber utilization and the allowance for decay, waste and breakage expected to be applied with respect to timber harvesting on the area,
    (v) the constraints on the amount of timber produced from the area that reasonably can be expected by use of the area for purposes other than timber production, and
    (vi) any other information that, in the chief forester's opinion, relates to the capability of the area to produce timber,
  (b) the short and long term implications to British Columbia of alternative rates of timber harvesting from the area,
  (c) Repealed. [2003-31-2 (B.C. Reg. 401/2003)]
  (d) the economic and social objectives of the government, as expressed by the minister, for the area, for the general region and for British Columbia, and
  (e) abnormal infestations in and devastations of, and major salvage programs planned for, timber on the area.

Appendix 2: Section 4 of the *Ministry of Forests Act*

Section 4 of the *Ministry of Forests Act* (Consolidated to June 20, 2003) reads as follows:

Purposes and functions of ministry

4 The purposes and functions of the ministry are, under the direction of the minister, to do the following:

(a) encourage maximum productivity of the forest and range resources in British Columbia;

(b) manage, protect and conserve the forest and range resources of the government, having regard to the immediate and long term economic and social benefits they may confer on British Columbia;

(c) plan the use of the forest and range resources of the government, so that the production of timber and forage, the harvesting of timber, the grazing of livestock and the realization of fisheries, wildlife, water, outdoor recreation and other natural resource values are coordinated and integrated, in consultation and cooperation with other ministries and agencies of the government and with the private sector;

(d) encourage a vigorous, efficient and world competitive timber processing industry in British Columbia;

(e) assert the financial interest of the government in its forest and range resources in a systematic and equitable manner.

Documents attached:

Appendix 3: Minister of Forests' letter of July 28, 1994

Appendix 4: Minister of Forests' memo of February 26, 1996

Appendix 5: Summary of Public Input

File: 10100-01

JUL 28 1994

John Cuthbert
Chief Forester
Ministry of Forests
595 Pandora Avenue
Victoria, British Columbia
V8W 3E7

Dear John Cuthbert:

Re: Economic and Social Objectives of the Crown

The *Forest Act* gives you the clear responsibility for determining Allowable Annual Cuts, decisions with far-reaching implications for the province's economy. The *Forest Act* provides that you consider the social and economic objectives of the Crown, as expressed by me, in making these determinations. The purpose of this letter is to provide this information to you.

The social and economic objectives expressed below should be considered in conjunction with environmental considerations as reflected in the Forest Practices Code, which requires recognition and better protection of non-timber values such as biodiversity, wildlife and water quality.

The government's general social and economic objectives for the forest sector are made clear in the goals of the Forest Renewal Program. In relation to the Allowable Annual Cut determinations you must make, I would emphasize the particular importance the government attaches to the continued availability of good forest jobs and to the long-term stability of communities that rely on forests.

Through the Forest Renewal Plan, the government is taking the steps necessary to facilitate the transition to more value-based management in the forest and the forest sector. We feel that adjustment costs should be minimized wherever possible, and to this end, any decreases in allowable cut at this time should be no larger than are necessary to avoid compromising long-run sustainability.

.../2

In addition to the provincial perspective, you should also consider important local social and economic objectives that may be derived from the public input on the Timber Supply Review discussion papers where these are consistent with the government's broader objectives.

Finally, I would note that improving economic conditions may make it possible to harvest timber which has typically not been used in the past. For example, use of wood from commercial thinnings and previously uneconomic areas may assist in maintaining harvests without violating forest practices constraints. I urge you to consider all available vehicles, such as partitioned cuts, which could provide the forest industry with the opportunity and incentive to demonstrate their ability to utilize such timber resources.

Yours truly,

Andrew Petter
Minister

Province of British Columbia

Ministry of Forests

OFFICE OF THE MINISTER

MEMORANDUM

File: 16290-01

February 26, 1996

To: Larry Pedersen
Chief Forester

From: The Honourable Andrew Petter
Minister of Forests

Re: The Crown's Economic And Social Objectives Regarding Visual Resources

Further to my letter of July 29, 1994, to your predecessor, wherein I expressed the economic and social objectives of the Crown in accordance with Section 7 of the *Forest Act*, I would like to elaborate upon these objectives as they relate to visual resources.

British Columbia's scenic landscapes are a part of its heritage and a resource base underlying much of its tourism industry. They also provide timber supplies that are of significant economic and social importance to forest industry dependent communities.

Accordingly, one of the Crown's objectives is to ensure an appropriate balance within timber supply areas and tree farm licence areas between protecting visual resources and minimizing the impact of such protection measures on timber supplies.

As you know, I have directed that the policy on management of scenic landscapes should be modified in light of the beneficial effects of the Forest Practices Code. In general, the new policy should ensure that establishment and administration of visual quality objectives is less restrictive on timber harvesting. This change is possible because alternative harvesting approaches as well as overall improvement in forest practices will result in reduced detrimental impacts on visually sensitive areas. Also, I anticipate that the Forest Practices Code will lead to a greater public awareness that forest harvesting is being conducted in a responsible, environmentally sound manner, and therefore to a decreased public reaction to its visible effects on the landscape. In relation to the Allowable Annual Cuts determinations that you make, please consider the effects that the new policy will have in each Timber Supply Area and Tree Farm Licence.

.../2

In keeping with my earlier letter, I would re-emphasize the Crown's objectives to ensure community stability and minimize adjustment costs as the forest sector moves to more value-based management. I believe that the appropriate balance between timber and visual resources will be achieved if decisions are made consistent with the ministry's February 1996 report *The Forest Practices Code: Timber Supply Analysis*.

Finally, in my previous letter I had asked that local economic and social objectives be considered. Please ensure that local views on the balance between timber and visual resources are taken into account within the context of government's broader objectives.

Andrew Petter
Minister of Forests